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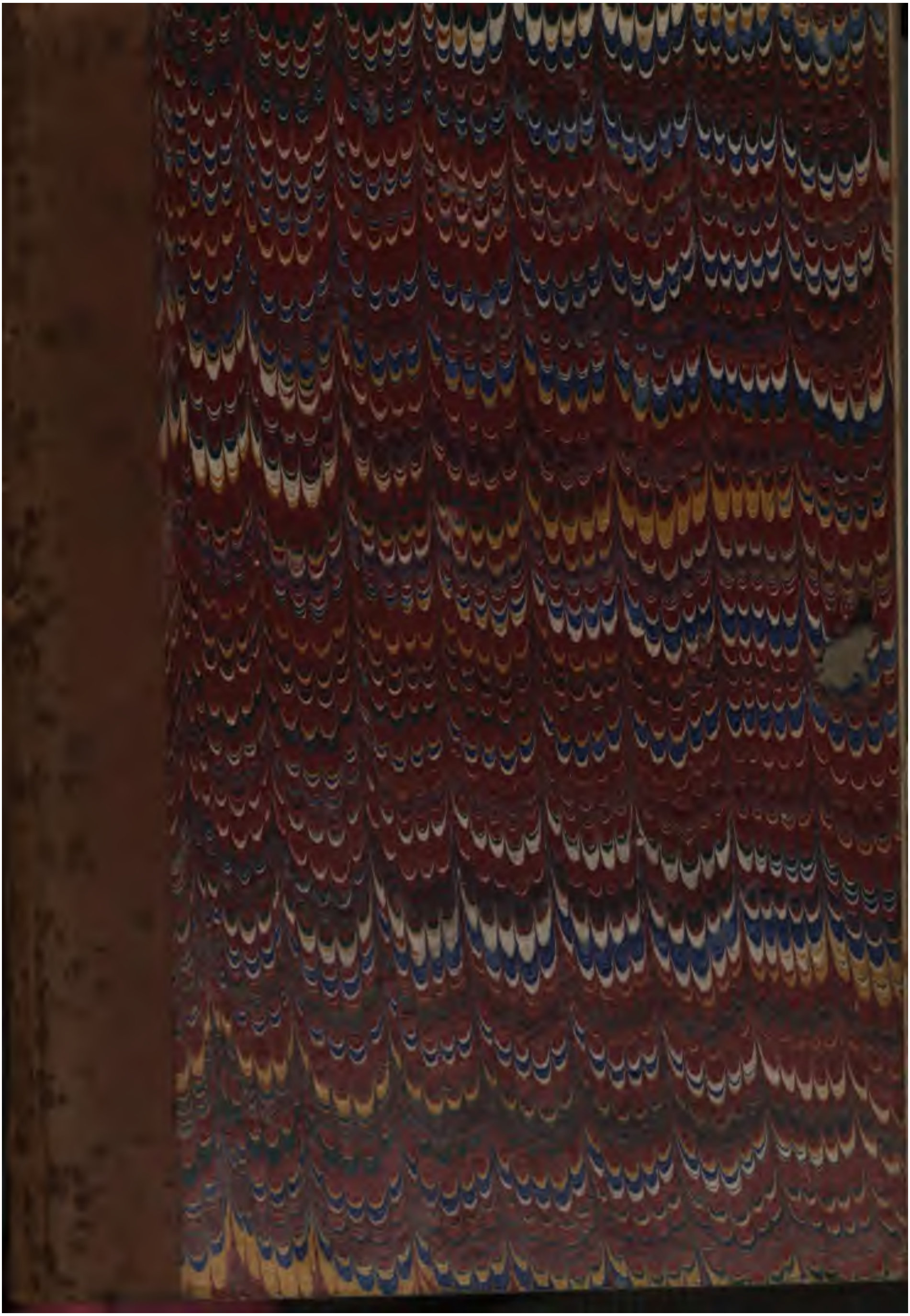

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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

MARINE PROPULSION.

(EXCLUDING SAILS.)

PART IV.—A.D. 1857-1866.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.

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PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866, amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct inventions, and many of those filed under the new law of 1852 indicate various applications of the single invention to which the Patent is limited. Considering, therefore, the large number of inventions and applications of inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will, from time to time, become apparent, and be supplied in future editions.

This volume is a continuation of the "Abridgments of "Specifications relating to Marine Propulsion," already published, and brings the Abridgments to the end of the year 1866. From that date the Abridgments will be found in chronological order in the "Chronological and Descriptive Index" (*see* List of Works at the end of this book). It is intended, however, to publish these Abridgments in classes as soon as the Abridgments of all the Specifications from the earliest period to the end of 1866 have appeared in a classified form. Until that takes place, the reader (by the aid of the Subject-matter Index for each year) can continue his examination of the Abridgments relating to the subject of his search in the Chronological and Descriptive Index.

This volume, like the former one relating to the same subject, comprehends all inventions which have reference to the propulsion of ships and other vessels through the water, except those in which the vessel is propelled by means of sails. Marine engines, steam and other, have consequently been included, as have all apparatus for the production of motive power, when such power is to be applied to the propulsion of vessels. Oars, paddles and propellers of various sorts, whether worked by manual or other power, are also included in the series. Apparatus for steering, when such apparatus acts by giving actual motion to the vessel (whether by ejecting jets of water, steam, air, or other fluid or aeriform matter, or by special paddle or screw) has been admitted, but steering mechanism which merely guides without moving the vessel has not. Paddles for swimmers, and means for propelling the human body in the water, attached to a life-belt or otherwise, have been excluded, In some inventions the power of the wind upon sails resembling those of a windmill has been utilized, these will of course be found in the following pages. The inventions of which the subject is connected with propulsion by means of sails, or with the rudders and rigging of ships, will form the subject of a future series of abridgments; those which treat of the construction of the hull must be looked for in the series entitled "Ship Building, " Repairing, Sheathing, Launching, &c." The present volume commences with the beginning of the year 1857; some few abridgments belonging to that year, which have already appeared in the previous volume, being repeated.

The Abridgments marked thus (* *) in the following pages, were prepared for another series or class, and have been transferred therefrom to this volume.

B. WOODCROFT.

May, 1872.

INDEX OF NAMES.

[The names printed in *Italic* are those of the persons by whom the inventions have been communicated to the Applicants for Letters Patent.]

Page
Abel, C. D..........212, 360
Adams, W. B..........184, 289
Adamson, D..........357, 427
———, W..........85
Ador, A..........404
Aitchison, R. K..........299
Aldborough, Earl of..........8
Aldridge, W. H..........110
Alexander, W. R..........78
Alexandre, L. P. L..........15
Allchin, W..........203
———, W. L..........203
Allen, E. E..........67
Allen, E. G...........120
Anderson, T..........230
Andreux, J. B..........304
Appleby, J..........252
Armstrong, R..........181
Arnaud, C...........213
Arnier, L...........75, 205
Ashe, E. D...........216, 233
Ashe, W. A..........216
Ashton, H..........56
Aston, J. J..........72
Atkin, R..........337
Attwood, H..........430
Austin, H. G..........144

Babin —..........101
Baker, C. S..........324
Balboni, P..........29
Balk, W..........41
Barker, E. B. B...........167
Barker, J..........10
Barland, M..........283, 304
Barland, T...........283, 304
Barling, J..........35, 112, 165

Page
Barnes, J. B..........99
Barnum, D...........49
Barter, W..........214
Barton, M..........126
Batchelor, H..........98
Bateman, S..........292
Bateson, S. S..........73, 85
Bauer, W..........125, 295
Baugh, P. A..........61
Baume, Marquis de la..........196
Baxter, G..........169
Beadon, G..........64, 411
Beale, J..........427
Beardmore, W..........71
Beauclerk, Lord C..........178
Beddat, P. A..........150
Bedder, W..........321
Behrens, H...........252
Bell, J. S..........129
——, R..........129
Belleville, J...........352
Bellford, A. E. L..........432
Belou, J...........207
Benett, J. T..........147
Bergue, C. de..........5
Berly, J. H. C. de..........219
Bettles, F. J..........113
Bevis, R. R..........117
Biddell, G. A..........41
Biddle, E. J...........239
Bier, M..........316
Billotet, —..........72
Birkbeck, G. H..........167
Bishop, J..........396
Blake, H. W..........171
Bleakley, J..........66
Boaz, W..........227

Page

Boden, J. 96

Boileau, E. G. X. 87

Bonell, C. 420

Borrie, P. 412

Borrows, E. 236

Boulton, M. P. W. 383, 388

Bourne, J. 1, 8, 18

Bousfield, G. T. ... 49, 133, 148, 205, 250, 282, 383

Boydell, J. 47

Boyman, R. B. ... 135, 372, 391

Bowie, A. 70

Box, W. W. 258, 277

Brabazon, J. D. 61

Brandt, L. 157

Braxton, C. G. 200

Brazill, J. 407

Breton, E. J. M. le 228

Brickhill, J. 134, 210

Brims, D. 429

Bristow, J. 430

Britt, T. 61

Brookes, W. 350

Brooks, A. J. 68

Brooman, R. A. 1, 21, 65, 66, 112, 185, 196, 199, 204, 255, 263, 294, 320, 352

——, C. E. 369

Brotherhood, P. 127

Brown, A. 319

Browne, B. 87

——, P. 41

Brunel, M. I. 397

Brunton, T. 400, 401

Buchanan, J. 54, 67, 68

Budden, J. L. 150, 236

Burch, J. 176

Burchall, B. 353

——, J. 236

Burden, W. B. 252

Burdon, J. A. 16

Burgh, N. P. 75

Burrell, J. 286

Burrows, J. 3, 23

Bury, W. 173

Bush, W. 222

Butlin, W. 131

Page

Bylandt, Count A. de 28

Byrom, J. 409

Cail, J. F. 190, 212

Calvert, W. 29, 298

——, J. 328

Campbell, J. G. T. 215

Camp, M. M. 39

Carleman, C. G. 17

Carter, G. 40, 380, 433

Cartwright, H. ... 221, 255, 331

Carvin, T. 227

Carwood, W. 227

Casartelli, J. L. 12

Catlin, G. 39

Caudwell, H. 321

Cavanna, G. 9

Cave, W. 39

Chadburn, C. H. 268

Chameroy, E. A. 36

Chaplin, A. 267

Chard, F. J. 108

Charlton, H. 105

Chateau, J. E. E. 350

Chatterton, R. D. 190

Chaufour, J. A. M. 36

Chease, S. A. 57, 242

Chenille, A. 393

Cherfils, A. D. 342

Chesneau, A. 95

Chesneau, A. 222

Chrystie, A. N. 185

Chusin, A. 294

Clair, J. E. M. J. 15

Clark, W. 45, 92, 96, 177, 183, 185, 205, 222, 225, 256, 334, 344, 362, 382

Clarke, E. F. 218

——, H. 24

Climie, D. 306

Clough, W. 100

Cochrane, A. A. L. P. 274

Coe, E. O. 250

Coffey, J. A. 116

Coignard, L. 134, 207, 254, 284

Cole, W. T. 332

Page
Colley, E. E. 309
Collier, E. H. 410
Collingwood, E. 37
————, T. 37
Collins, W. S. 108
Colwell, C. 110, 227
Cook, H. O. 242
Cooke, J. 213
———, W. 201
Cooper, S. 427
Cordner, E. J. 96
Coulon, E. 304
Coulon, E. 185
Coumbary, C. St. 344
Cousins, S. L. 302
Coward, R. A. 7
Cowper, C. 426
———, E. A. 231
Cox, J. 328
Craddock, T. 414
Craig, T. 331
Craymer, W. 28
Cresswell, T. 131
Crichton, A. 164, 372
Crispin, W. H. 80, 148
Croft, J. M. 261
Crooker, M. A. 7, 86
Crooker, M. A. 324
Crosland, J. S. 49
Crossley, J. W. 127
Cunningham, H. D. P. 206
————, W. J. 314
Curtis, W. J. 224, 382
Cusset, G. 114

Dale, R. F. 379
Dampier, C. E. 317
Darlu, A. P. M. 418
Dart, R. H. 322
Davidson, F. 147
Davies, G. 20, 39, 94, 143
———, R. 334
———, W. 402
Davis, N. 224
Davison, T. 170, 212
———, T. B. 168
Day, C. A. 252
Day, S. J. V. 331
———, W. 107
Dealtry, C. 428
Dean, J. 184, 305, 318
Deane, C. A. 411
———, E. 353
———, H. D. 9
De Bergue, C. 5
De Berly, J. H. C. 219
De Bylandt, Count A. 28
De Erlanger, F. E. 199
Defis, G. 21
De la Baume, Marquis 196
Delany, W. 74
De Lowendal, R. B. H. 45
De Mesnil, Baron O. 355
Densmore, B. 156
De Rigel, A. P. 403
De Rusett, E. W. 379
Desboissières, N. F. C. 114
De Scalzi, P. 183
Dewhurst, J. 46
Dickerson, E. 250
————, *E. N.* 133
Doering, F. B. 135
Dorsett, W. S. 38
Douglas, Sir H. 57, 69
Drewe, H. G. 157
Droop, J. F. 386
Dudgeon, W. 385
Duncan, R. 390
Dunn, T. 97
Duntz, J. A. 233
Duvoir, N. 139

Eads, J. B. 346
Eastman, T. 99, 107
Eaton, J. 81
Elder, J. 36, 71, 89, 102, 275, 365, 376
———, W. 72
Elliot, W. H. 20
Erlanger, F. E. de 199
Eunson, J. 115
Eunson, R. G. 115
Evans, T. 126
Evelyn, G. P. 374

INDEX OF NAMES.

Page

[illegible] 319
[illegible] 407
[illegible] 161
[illegible] 315
[illegible] 350
[illegible] 350
[illegible] 350
[illegible] M. B. A 350
[illegible] 141, 192
[illegible], J 347
Fitzmaurice, Hon. W. E....162
Fletcher, A. C. 364
Fletcher, L. E 40, 136
Fontainemoreau, P. A...18, 31, 307
Forbes, H 262, 385
Ford, D 274
——, W. C 245
Forster, E 363
Foster, W 43
Fraser, J 399
——, R. W 340, 377
Freemantle, J 239
——, S 239
Friedmann, A 199
Fryer, A 192
Fuller, G. H 288
——, W. C. 161
Furlonge, W. H 198
Furness, H. D 258
Furrell, F 369
Fyfe, J. B 324

Gache, V. 42
Gache, [illegible] 101
——, V. 144
[illegible], I. 226
Galloway, E 406
——, G. R 30, 83, 310, 313, 438
——, J. 422, 423
——, W 422, 423
[illegible] 221
[illegible] 382
[illegible] 265
[illegible] 143
[illegible] 19

Gavillet, J. D 221
Geach, W 26
Geary, S 416
Gedge, W. E......114, 251, 263, 342, 393
Germain, R 104
Germann, A. F 33
——, F. G 33
——, J 33
Gibson, A 50
Giles, J. W 57
Girard, L. D 345
Glanville, R 227
Gloag, H. D 282
Gollings, W. C 320
Goodier, J 347
Gorton, W 375
Goupy, M. L 194
Græme, P. St. G 275, 281
Graham, W 265
Grahame, T 13
Gray, H 133
Gray, J 438
Green, E 335
——, E. the younger 335
——, R. A. W 242
Greenwood, J 53
Gregory, J 28
Grice, S 214
Griffith, W 117
Griffiths, J 217
——, R....38, 160, 223, 274, 294, 322, 371
Grimaldi, F 147, 202
Grimshaw, W. D 14
Grogan, R 225, 240
Guffroy, C. C. J 117
Guignes, J. B 294
Gullett, H. W 60
Gumpel, C. G 100
Gyton, J. B 156

Habel, E 197
Hackworth, J. W 104
Haddan, J. C 4
Hadfield, W 300
Hall, S ....[illegible]

Page
Hall, W. K...............310, 436
Hamilton, A....................24
———— John.........123, 355
———— John, jun... 40, 130, 146, 315
Hancock, C. L..............352
———— F. L...............352
Harfield, W. H.........186, 394
Harratt, C....................155
Harrington, H...............357
Harris, F. W..................256
———— *J*..............281, 302
Harris, J.......................229
———— J. R. 228, 251
Harrison, J...................425
Hart, G. W....................154
Harvey, J......................293
Hawkins, C...................110
————, J.....................110
Hawksley, G. W.............167
Hay, J..........................223
Haycraft, W. T...............413
Hayes, E.......................247
Hearn, W......................402
Heather, A....................253
Hédiard, A.....................26
Henderson, J. M.........26, 155
Henry, M....28, 134, 207, 237, 254, 284
Hill, B..........................42
Hill, J. R.......................224
Hinde, T. C...................238
Hiron, H. F....................141
Hirsch, H....96, 102, 145, 159, 354
Hirsch, H.......................92
Hoby, J. W....................431
Hodson, W....................264
Holderness, T. H............272
Holmes, J......................81
Honeyman, J..................79
Hook, C........................327
Hooper, J. H.................113
Hope, D. G....................20
Hopkinson, W.................46
Horton, I......................127
Houston, R. H..................3
Howard, J....................341

Page
Howard, T.........................4
Howden, J...84, 157, 204, 278, 358
Hudson, R. H.................381
Hughes, E.....................389
———— J. G..................317
———— T......................185
Hugon, P.......................248
Hulme, T. D...................118
———— W......................118
Humphrys, E.......67, 95, 122, 126, 170, 176, 283, 318, 388, 417
Hunt, T...........................80
Huse, S.........................69
————, *S., jun*.................69
Hutchinson, W. N............233
Hutton, H.......................100
Huygens, de Lowendal, R. B. 45
Hyde, J..........................113
———— J. M.......................1

Inchley, J......................120
Inglis, H........................410
———— W.......................236

Jaffreys, G. W.................437
Jack, J.....................102, 144
Jackson, A.....................308
Jackson, M. M................341
James, C. C.....................25
————, Jabez...................94
————, John....................14
————, W. H.............26, 166
Jaques, J. A....................161
Jean, L. J. J....................269
Jeandeau, F......................1
Jensen, P.........................65
Jobin, J. D.....................201
Johanny, R......................44
Johnson, J. H....22, 36, 42, 61, 81, 114, 139, 213, 219, 265, 270, 281, 302, 358, 370, 386, 429
Johnstone, A...................244
———— J. S....................384
Jolliffe, T......................265

Page
Joliffe, W..........265
Joly, P. F..........27
Jones, E. S..........311
——, G. F..........177
——, J..........177
——, T..........407
Jopling, J..........326
Jouan, A..........94
Jouvin J. P..........221

Keene, G. A..........337
Kendrick, I..........127
Kennedy, J..........222, 273
Kilshaw, J. F..........347
King, H..........135
Kingsley, J..........52, 138
Kirk, A. C..........386
Knowelden, J..........216
Kochs, W. E..........379
Kopisch, C. G..........30, 234
Krupp, A..........217
Kyle, A..........161
Kynaston, A. F..........8

La Baume, Marquis de..........196
Labriola, J..........213
Lacroix, E..........108
Labrousse, N. H..........112
Lake, J..........335
Lamb, A..........172, 252
—— G..........247
Lambert-Alexandre L. P..........15
Lauras, M. B..........402
Lawrence, B..........319
Lebaudy, A..........190
Le Breton, E. J. M..........228
Lee, T. V..........48, 435
—— W..........199
Lees, R..........300
Lehmann, L. T..........178
Leigh, E..........219
Le Rouge, J. P. V..........219, 237, 370
Levallois, H. A..........251
Levieux, S..........26
Lewis, D. B..........156
Lighthall, W..........185, 297

Page
Lillie, Sir J. S..........305, 421
Limbert, J. A..........4, 23
Linton, J..........401
Livingstone, W..........277
Loach, J..........99
Löbnitz, J. H. C..........26
Lockwood, J..........285
Lovell, J. G..........82
Lowe, J..........229
Lowendal, R. B. H. de..........45
Lucena, J. L..........409
Luis, J..........52
Lungley, C..........43
Lyttle, W. A..........329

Maberley, F. H..........68, 78
Mace, C..........242
Mac Farlane, J..........432
MacGeorge, I. M..........367
——, S..........367
Macintosh, J..........311
Macnab, W...32, 132, 142, 151, 195, 209, 430
Main, D..........424
——, T..........431
Mahon, A. I......153, 191, 230, 241
Makinson, A. W..........395
Mallet, L. P. F..........15
Manley, W. R..........282
Manning, R. L. P..........70
March, C..........18
Mardell, D..........159
Markland, T..........282
Markham, C. R..........316
Marshall, W..........69, 88
Martin, A..........34
Martin, J. S..........386
Martin, Jean..........34
——, John..........50
——, W. A..........152
Maryón, R. J..........22
Masnata, D. F..........362
Mason, W..........439
Matley, M..........55
Maudslay, J..........401, 440
Maurer, J. J..........119
Maxwell, J. A..........129

Page
May, G..........98
Mayet, C..........5
Mazeline & Co..........100
McComb, E. C..........339
McComb, J. J..........339
McConnell, J. E..........212
McGrade, P..........7
McIvor, W, G..........316
McNaught, W..........184, 413
Meirat, Y..........258, 271, 292
Mennons, M. A. F..........144, 191, 207
Mercier, F. J..........263
Meriton, T..........99, 207
Merlanchon, A..........256
Merlett, J..........288
Merriam, S. S..........366
Mesnil, Baron O. de..........355
Meunier, J. C..........65
Middleship, W..........85
Miller, J. J..........165
——, John..........122
——, Joseph..........31
——, T. W..........90, 137, 174, 290
Milner, J..........431
Mohr, J..........22
Mols, F..........348
Monro, A..........307
Montgomery, J..........76
Moody, E. T..........266
——, T..........266
Moore, G, S..........2
——, R..........20, 182, 220
——, T..........161, 194
Morgan, J. B..........73
Moriarty, C..........356, 439
Morris, W..........146
Morrison, R..........3, 123
Morton, A..........84
Mouline, E..........270
Muir, W..........6
Muntz, W. H..........135, 213
Murphy, W. J..........357
Murray, G..........19
——, J..........35
Mycielski, M..........325
Myers, E..........262, 282

Page
Napier, D..........416
——, J. R..........234
Needham, J..........116
Nelson, M..........53
Nesmond, P. C..........307
Neville, T..........38, 375
Newcomb, J..........82
Newton, A. V..........17, 44, 63, 69, 85, 85, 95, 120, 156, 268, 439
——, W. E..........16, 47, 75, 83, 87, 100, 104, 157, 165, 195, 199, 256, 288, 297, 309, 346, 364, 409, 420, 437.
Nicholson, J..........70
Noble, J..........134
Normand, A..........62
Nystrom, J. W..........93

Ogle, N..........12
O'Hanlon, P..........180, 187
O'Hara, C..........77
O'Keefe, T..........283
Oliver, W..........76
Onion, T..........226, 416
Orton, R..........412
Osborne, C. S..........366
Osler, A. F..........301
Owen, E. L..........27
——, R. A..........216

Padley, S..........201
Page, T..........256
Palmer, H..........142
Papengouth, O..........178
Parker, James..........34, 83, 152, 213, 271, 293, 376
——, John..........24
Parkes, J. D..........194
Parsons, P. M..........408
——, W..........49
Pascoe, J. B..........64
Patek, C..........265
Paterson, A. J..........11, 57
——, R..........170, 279
Patridge, D..........6, 30
Paumier, P. A..........236
Peace, A..........327
Peck, W. B..........172

Page
Penn, J......25, 246
[illegible], H. N......94
[illegible], W......397
Perkins, L......109
Peters, J......211
[illegible], A. A......236
Phillips, J. S......197, 218
Phillips, L. D......74
Phillips, W. H......367
Philp, J......35, 164, 208
——, R......35, 164, 208
Phinney, T. W......85
Phipps, G. H......390
Piatti, T......55, 220
Picot, L. F......27
Pilkington, W......150, 236
Pim, W......420
Pinker, J......32
Pirsson, J. P......43
Pokutynski, S......325
Pollock, J......50
Poole, M......415
Porter, C. T......165
Potts, F......111
Powell, H. B......106
Press, W......21
Prideaux, T. S......103
Prince, A......92
Pringle, G......37
Pullan, A......131
Purdie, J......152

Quidde, A......5

Rammell, T. W......155
Randall, H......358
Randolph, C......89, 392
Ranken, G......124
Rankin, D......323
Rankine, W. J. M......234, 338
Raphin, A......334
Rawstorne, J......42
Raymond, H......36
Read, E. T......324
Reed, J. H......10
Reddie, J......82
Redfern, J......124, 253
Reeve, J......32, 34

Page
Reid, J......309
Rennie, G......28
Renwick, E. S......148, 205
Reuver, D......29
Révy, J. J......148
Reynolds, J......92
——, J. W. B......411
Rice, J......61
Richardson, T......437
Ridley, J......173
Rigel, A. P. de......403
Rigg, A......270, 289, 371
Rippingille, E. A......189
Robatel, J......15
Roberts, M. J......312
Robertson, J......325
——, W......78, 114
Robb, J......66
Roberts, R......154
Robson, J. T......47
Rodd, W. J. H......12
Rojare, L. F......225
——, *L. C. E*......225
Romaine, R......138
Rosselet, G......320, 345
Rouge, J. P. V. Le......219, 237, 370
Rowan, D......71
——, J. M......54
——, W......95, 436
Rowland, E......23
Runkel, M......252, 303
Rusett, E. W. De......379
Russell, C......86
——, G. F......361
——, J......21
Ruthven, M. W......323

Sager, W......418
Sahler, G......255
Salmon, H......317
Salmon, P......140
Salzmann, A......204, 263
Samain, P......320
Sampson, G. R......91
Samuel, J......70
Samuelson, C. E......391
Scalzi, P. de......183

Page
Schiele, C........................125
Scholl, J. T.....................177
Schön, C..........................145
Schwann, T........................432
Scott, J...........................56
——, T..............................91
Seaward, S........................404
Sedley, A. J......................336
Selby, G. T.......................190
Sells, C..........................111
Sergeant, H. C...................85
Serve, J. P.....................268
Simpson, C. H..........136, 330
Sharp, G...........................72
Shaw, F...........................298
Sheard, S. C.......................13
Shepard, J.......................99
Shepherd, J.......................126
Sheridan, J. B....................282
Sickels, F. E............232, 273
Sievier, R. W.....................112
Silver, T......12, 110, 123, 134, 194
Simons, W..............192, 319
Simpson, C. H..........136, 388
Singer, I. M............153, 349
Skinner, A. M.....................193
Skinner, P. K....................87
———, *P. K. M*....................193
Slater, J.........................403
Sloman, E..........................98
Sloper, J..........................30
Smethurst, J............249, 249
Smith, James.............57, 242
——, John...........................96
——, J. R...........................64
——, G. W..........................351
——, W..............60, 93, 108
Soares, A.........................332
Soelman, W...............60, 81
Spencer, J. F...33, 41, 116, 163
———, T...........................210
Spill, D..........................106
——, G.............................106
Spink, D....232, 327, 340, 359
Spratt, H. W.......................21
Squire, F.........................201
Stackpole, G....................369

Page
Standfield, James.................202
———, John.........................202
Stanley, J........................270
———, J. M........................270
St. Coumbary, C..................344
Stevens, C........................101
Stevens, F. B...................195
Stevens, J. L......................88
Stevenson, H. B...................141
———, J............................333
Stewart, C. P......................20
Stimers, A. C...................309
Stodart, J........................147
Storey, E.........................395
Stow, G...........................417
Stübbe, W. H......................248
Stubbin, F..........................6
Suckow, E.........................197
Summers, T........................252
Swift, H. S.........142, 332, 362
Sykes, B. C.......................127
———, T............................127
Symes, J..........................287
Symonds, T. E..........154, 245
Symons, A.........................168
——— H. C..........................433
———, T............................113

Taggart, J.......................91
Tapp, T.........................150
Taylor, Jacob..........296, 312
———, James..........................3
———, H............................265
———, W.............................61
Teissier, J. A....................398
Terry, E. G.......................242
——, C. F..........................228
Thier, P. L. T...................190
Thierry, J. B. P. A...............253
Thierry, J. B...................383
Thomas, L.........................318
———, J. R..........................64
———, Y. M..........................86
Thomson, G........................435
———, W.............................34
Thornton, F.......................305
Thurgar, A. H.....................311
Tipple, W.........................202

Page
Tissot, R.........28
Tod, W.........86
Todd, J.........101
Tolhausen, F.........239
Tone, J. F.........258
Tongue, J. G.........317
Towl, J.........179
Tranchant, C. A.........360
Trappes, H.........11
Travis, E.........12
Tristram, W. J.........268
Troll, C. J. I.........263
Trotman, H.........376
Truss, T. S.........151, 169
Tucker, W. H.........266
Turner, F. W.........187
———, H.........90

Udney, J.........399
Underwood, G.........13
Uren, E. W.........119

Vaile, R.........219
——, S.........308
Vanossi, J.........66
Vasserot, C. F.........72
Venzano, G. B.........333
Vergne, J.........9
Vincent, J. B.........194
Vine, J.........306
Vines, R.........148

Wain, W.........121
Walker, R.........182
Warwick, T.........162
Washington, J. H.........95
Watson, E.........264
———, J.........168
———, J. S.........351
———, W.........313
Watts, G. E.........150
Weallens, E.........229

Page
Weallens, W.........166, 229
Weatherdon, B. F.........428
Webster, W.........48
Welch, W.........196, 281
Wenham, F. H.........109
Wetherill, J.........285
Wheatley, J.........280
White, J. G.........303
Whitehouse, W.........91
Whitelaw, J.........423
Whytehead, W. R.........428
Wild, J.........283
——, M.........167
Williams, C. W.........55, 228
———, T.........282
———, W.........9
Williamson, A. W.........109
Wilson, C.........396
———, E. B.........269
———, R.........37, 163
Wimshurst, H.........295
Winans, R.........50, 51, 52
———, T.........50, 51, 52, 258, 259, 260, 260, 260, 261, 276
———, W. L.........258, 259, 260, 260, 260, 261, 276
Wingate, T.........5
Winter, W.........354
Wolcott, A.........83
Wood, T.........324
Wood, W. W. W.........61
Woodward, J.........359
———, W.........359
Wright, James.........66, 133
———, John.........419
———, Joseph.........62
———, R. H.........286
Wymer, F. W.........243

Yollet, —.........101
York, J. O.........421
Young, H. B.........361

MARINE PROPULSION.

(EXCLUDING SAILS.)

(PART IV.)

1857.

A.D. 1857, January 1.—N° 4.

BOURNE, JOHN.—(*Provisional protection only.*)—"An improved "steam train for navigating shallow rivers." Barges with concave and convex ends are coupled together in a train to be towed by a steamer. They may be steered by adjusting the position of the last of the train. Paddle wheels at the sides may work on the bottom in shallow water, and thus clear it away and propel the vessel. A centrifugal wheel may be used. Two screws may be used at the bows, to wash away sand from the course. If the foremost barge gets aground while the train is descending a rapid stream, a pole is lowered from the last barge so as to stop the train.

[Printed, 4*d.* No Drawings.]

A.D. 1857, January 5.—N° 43.

HYDE, JOHN MOORE.—"Improvements in iron and wooden "ships or vessels, and in the adaptation of the machinery for propelling the same." The afterpart of the vessel is constructed so that, being wider at the "screw post," the propeller may be enclosed between shutters.

A condenser is formed by partitions in the stern dead-wood, and pipes may conduct the water from without into the chamber, which is provided with a manhole. Reference is made to No. 2513, A.D. 1854.

[Printed, 6*d.* Drawing.]

A.D. 1857, January 10.—N° 96.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from François Jeandeau.*) — (*Provisional protection only.*)—"Improvements in propelling ships, boats, and other vessels."

A ship's hull or a platform is supported on the water by drums upon shafts. Propulsion is effected by a screw or other propeller or by a steam engine turning the drums with or without floats on their peripheries, which then act like paddle wheels.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 7.—N° 349.

LIMBERT, James Alfred.—(*Provisional protection only.*)—"Improvements in marine steam engines."

The invention comprises the following features:—

Two piston rods diagonally placed one on each side of the crank, one above and the other below the crank shaft.

The condenser apparatus on the opposite side of the crank shaft to that of the steam cylinders.

The air pump of each cylinder worked direct from the steam piston by a rod through the cylinder cover arrangements of the foot valves and delivery valves.

The slide valves worked by a weigh shaft in a single long bearing.

The expansion valve gearing between the engines.

The starting gear worked by a horizontal wheel.

The throttle blow through expansion valves and injection cock handles combined with the starting gear levers and the pressure and vacuum guages.

A high hot well between the condensers and air pump.

T-shaped pipes leading to both cylinders from a single steam pipe, with a disc in the exhaust pipe for closing the communication between the two engines.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 7.—N° 350.

HADDAN, John Coope.—(*A communication.*) — (*Provisional protection only.*)—"Improvements in marine steam engines."

The water used for condensing steam in the condenser is cooled for use again by sending it through pipes in cold water inside the vessel or outside.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 10.—N° 394.

HOWARD, Thomas.—"Improvements in the construction of "cranked shafts or axles."

The cranked parts are in separate pieces fitted to the shaft parts, and have the joints made fast by shrinking them on. Their tendency to loosen is obviated by the use of keys or by making them oval or polygonal.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 12.—N° 420.

WINGATE, Thomas.—" Improvements in screw propellers and " in adjusting the same."

Each blade is attached to the boss by the shank passing through a hole, and at this part the shank is conical, so that when it it is pressed towards the centre, the blade is firmly fixed. In the hollow boss is a lever arrangement (worked by a screw and key from the vessel) for pressing the shanks outwards, so as to allow one of them to be turned by a clip applied from above to its outer edge, which is moved until it stands uppermost for the purpose. A cogged sector in the shank turns a cogged wheel loose on the shaft, and embracing the boss. As this wheel gears into the sectors of both blades, when one is turned the other is caused to set in a corresponding position.

[Printed, 10*d*. Drawing.]

A.D. 1857, February 18.—N° 471.

DE BERGUE, Charles. — (*Provisional protection only.*) — " Improvements in marine steam engines."

The water heated in the condenser is cooled in pipes exposed to the water outside the vessel so that it can be used again.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 21.—N° 519.

QUIDDE, Auguste, and MAYET, Charles.—" Improvements " in propelling."

" This invention consists in adapting to vessels cylinders open " at one end, and fitted each with a piston working air-tight " therein; said cylinders may be placed either within the vessel " to be propelled at or near the stern thereof, or they may be " placed at the outside of the said vessel; in either case they " must be placed below the surface of the water in which the " vessel is.

" The aforesaid pistons may be worked either by steam power
" or by manual labor, the effect being to propel the vessel by
" impulsion of the aforesaid pistons against the water which
" enters their respective cylinders each time they are exhausted
" of atmospheric air."

[Printed, 6*d.* Drawing.]

A.D. 1857, Febuary 28.—N° 584.

STUBBIN, Frederick.—(*Provisional protection only.*)—" Im-
" provements in propelling vessels."

The " improvements consist in peculiarly constructed end-
" less bands or chains passed over two or more suitable drums or
" wheels placed on each side of the vessel, and worked by steam
" or other power. The chains or bands have floats or paddles
" attached to them, and the chains are so constructed and
" arranged, that by means of cogs thereon, corresponding with
" similar cogs on the drums or wheels, they are forcibly carried
" forward, and their slipping effectually prevented. When the
" chains or bands are of a length to require it, one or more extra
" drums may be placed intermediately to relieve the chain on the
" working drums."

[Printed, 4*d.* No Drawings.]

A.D. 1857, March 2.—N° 613.

PARTRIDGE, David.—" Improvements in steam boilers."

Steam is superheated by passing it through tubes or steam-dents or chambers in the passage from the fire-place to the funnel, and so connected as to cause the steam to pass through them in a serpentine path. It is then conducted to a chamber where it is mixed with common steam.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1857, March 5.—N° 641.

MUIR, William.—" Improvements in generating steam for
" marine purposes."

The feed water is heated by passing it through pipes in the smoke box exposed to the escaping heat from the furnace and flues.

When the feed supply is cut off, a " self-acting valve arrange-
" ment " causes a constant current through the heating apparatus.

The system of pipes is arranged in the boiler, furnace flues, or smoke box, in parallel rows with connecting elbow joints.

[Printed, 10*d.* Drawing.]

A.D. 1857, March 5.—N° 655.

COWARD, Richard Atkinson.—(*A communication.*)—" Improvements in screw or submerged propellers."

In this screw "the greatest amount of effective propelling surface is brought as near as it can be got to the axis, the object being to take a advantage of the well-known tendency which many screws are known to possess, of drawing the water from the circumference towards the centre, and forcing it back in the form of a cone, expanding as it recedes."

" The end view of an ordinary screw propeller represents two isosceles triangles, whose vertices are conterminous at the axis. The end view of the present propeller represents two trapeziums in the reversed position; in fact, the shape of the arms of this propeller in some slight degree resemble those known as Griffith's propellers, differing, however, essentially both in their size and their general principles. In the present invention the sphere, which is the distinguishing characteristic of Griffith's propeller, is dispensed with, and the space, which in Griffith's arrangement is filled in with a sphere of metal with a view to diminish friction about the axis, is according to the present improvement taken full advantage of, by the blades coming to the axis where they are made widest, and they diminish from thence to the circumference."

[Printed, 6*d.* Drawing.]

A.D. 1857, March 7.—N° 671.

McGRADE, Patrick. — (*Provisional protection only.*)—" Improved machinery or apparatus for propelling ships."

Feathering paddles are fixed on frames worked by two parallel cranks, so as to keep the floats vertical, as illustrated in a rough fac-simile drawing attached to the Specification.

[Printed, 6*d.* Drawing.]

A.D. 1857, March 21.—N° 800.

CROOKER, Matthew Augustus.—" Improvements in paddle-wheels."

The wheel is in sections, each of them with their floats descending to various depths, and so placed that the floats of adjoining sections will descend to different depths.

[Printed, 6*d.* Drawing.]

A.D. 1857, April 4.—N° 935.

BOURNE, JOHN.—" The generation and application of motive " power."

Fuel in a state of dust is caused to enter a fan or condensing instrument, and mixed with the air is propelled into a hot chamber, where the air is expanded by combustion, " and this hot air may " be used for propelling vessels on the principle of a rocket, by " being forced out below the water astern, or it may be used to " move machines resembling a Barker's mill, a smoke jack, or a " turbine."

[Printed, 4*d.* No Drawings.]

A.D. 1857, April 9.—N° 1001.

KYNASTON, AUGUSTUS FREDERICK.—(*Provisional protection only.*) — " Securing and disconnecting ships' boats and towing " cables."

The boat is suspended by the usual tackles. A bar with runner blocks is secured to the keelson and by means of a capstan or windlass the boat can be instantaneously disengaged when it reaches the water. The towing cables of a steamer are worked by a capstan of the kind mentioned above so as to equalise their strain and to enable them to be slipped when necessary.

[Printed, 4*d.* No Drawings.]

A.D. 1857, April 14.—N° 1054.

ALDBOROUGH, BENJAMIN O'NEALE STRATFORD, Earl of.— " Improvements in aerial navigation and in the apparatus con- " nected therewith, parts of which are applicable to locomotion " generally."

Aerostats of various shapes are connected to boats or ships and caused to tow them; also the weight of a crew or cargo is shifted backwards and forwards so as to actuate the wings or propellers of a boat.

[Printed, 2*s.* 6*d.* Drawings.]

A.D. 1857, April 18.—N° 1099.

DEANE, HENRY DANIEL.—"Improvements in the floats or "paddle boards of paddle wheels."

Tapering holes are made through the floats with the larger parts towards the water as it is struck. The floats may be either wood or metal. Tubes may be fixed in the holes. The advantages claimed are, that "the float leaves the water free from back-"water, and also that the water passing through the perforations "of each float supplies a body of water for the next float."

[Printed, 8*d*. Drawings.]

A.D. 1857, April 22.—N° 1130.

WILLIAMS, WILLIAM.—(*Provisional protection only.*)—"An "improved propeller for propelling ships, boats, and other "vessels."

"My propeller consists of an oar-like blade, connected to a shaft "depending from the vessel behind and clear of the rudder. "The shaft passes through the blade, and a nut or other like "contrivance prevents the blade falling off the shaft. Connected "to the shaft, and immediately over the upper end of the blade, "is a cap or shield carrying two stops which project downwards, "and between which the blade is free to move upon the shaft as "an axis, in order to enable it to feather when being moved, "as hereafter explained. The upper part of the shaft is pierced "at intervals, whereby to regulate the immersion of the propeller, "and is connected by a pin or otherwise to a horizontal shaft, to "which a rocking motion is communicated by hand or other "power. Upon the horizontal shaft being rocked, a sculling "motion is communicated to the propeller, which drives forward "the vessel, and the blade being free to move upon its axis "'feathers' and opposes its smallest surface to the water on its "return, or at the dead part of its stroke."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 22.—N° 1135.

CAVANNA, GEROLAMO.—"Improvements in obtaining motive "power."

A hollow vessel at each end of an oscillating beam is connected with a flexible receiver within a ship's hull.

Counterweights and valves are described for effecting such changes in the pressure of the external water as to cause it to be lifted and used for motive power.

[Printed, 10d. Drawing.]

A.D. 1857, April 28.—N° 1193.

BARKER, James.—(*Provisional protection only.*)—"Improved "propeller for ships and vessels."

The "propeller consists of a float or blade made to travel to and "fro in a case, and to feather in its return stroke, so as to offer "as little resistance as may be when not performing its propelling "action.

"The propelling float or blade is centred upon the end of "a shaft, and has connected to it a guide or pulley which works "or work in guides formed by grooves in a case free to slide to "and fro within certain limits in a fixed case, springs being "sometimes employed to assist in feathering and altering the "position of the blade. The sliding case is only moved when "required to reverse the action of the propeller. The guide "pulley or pulleys is or are so placed that it or they cause the "float to present its most extended surface when propelling, and "to turn or feather in the return stroke. By means of a rack "and pinion, the sliding case is brought into action when the "motion of the propeller is reversed. One, two, or more of "these propellers may be fitted to each vessel."

[Printed, 4d. No Drawings.]

A.D. 1857, April 29.—N° 1201.

REED, Joseph Haythorne.—(*Provisional protection only.*)—"Improvements in propelling ships or vessels."

"This Invention relates to a peculiar construction and arrangement of paddle wheels suitable for either sea or inland navigation, whereby the back lift or water, so objectionable with "ordinary paddle wheels, is obviated, whilst the water is directed "either to the ship's sides, so as to close in or meet in the wake "of the ship, or it may be directed outwards from her sides if "found desirable; the former action being preferred for canal "or inland navigation, whereby the banks are less injured by the "swell or surge, and the reverse action may be used for sea-going "boats.

"According to this Invention the principle of the screw propeller is applied to paddle wheels, that is to say, the floats or " propellers are arranged in the form of a screw or portion of " a helix, in place of being parallel to the axis of the paddle " wheel, as in wheels of the ordinary construction.

"These helicoidal floats extend over about one-half of the " circumference of the paddle wheels, and consequently may " considerably overlap each other; that is, one helix or float " begins before the other is completed, so that there will be no " striking or concussion against the water produced by the " entrance therein of the floats singly, since there will always be " two or more floats entering and leaving the water without any " intermission, one float entering before the other leaves the " water."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 2.—Nº 1240.

PATERSON, Alexander John.—" An improved method of " constructing and propelling vessels."

Screw blades are fixed on a hollow conical drum, the larger end of which corresponds with the circular vertical end of the vessel. The drum revolves close to this end, and thus constitutes the bow or stern of the vessel.

[Printed, 10*d*. Drawing.]

A.D. 1857, May 16.—Nº 1387.

TRAPPES, Henry.—(*A communication.*)—" An improvement in " the construction of a sliding drawer, applicable to all steam " engines, either fixed or locomotive, for the distribution of steam " aëriform or liquids, used either as a motive power, or for any " industrial or artistic purpose."

" In the sliding drawer or slide valve, the subject of the present " invention, the lips or edges thereof surround it and are perpendicular to the direction of its motion," and the usual parallel lips are done away with; the steam chambers or steam chest " is " divided into three compartments," of which the centre one communicates with the exhaust and the other two " then become " the steam introducers."

By these arrangements the slide valve works under an equilibrium of pressure and with diminished friction.

[Printed, 10*d*. Drawing.]

A.D. 1857, May 16.—N° 1391.

OGLE, NATHANIEL.—(*Provisional protection only.*)—" An im-" proved method of propelling and ventilating ships."

The steam-engine works air-engines which are used to ventilate the vessel and to work pistons acting directly on the water.

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 23.—N° 1456.

TRAVIS, EDWIN, and CASARTELLI, JOSEPH LOUIS.—" An " improved apparatus for regulating the supply and discharge of " steam, air, water, and other fluids."

This "steam trap" consists of a box and sliding tube with a piston and escape tap. It is fixed to a pipe attached to the ordinary steam pipe, and has a compensating arrangement by a band, coil, or flexible disc, and it may have a swivel joint for adjusting its attachment to the sliding tube. Means are explained for reversing the ends of the trap.

[Printed, 1*s*. Drawings.]

A.D. 1857, May 23.—N° 1459.

SILVER, THOMAS.—" An improved steam engine governor."

A small fly wheel is caused to turn on a horizontal axis, and two vanes upon it, acted on by a spring, are so centred as to open against the air and retard the motion of the wheel when it is too fast. At the same time a luted shaft revolves upon the axis, and by the action of a bevil wheel on the fly wheel and the pinion winds up two parts of a chain and acts so as to press more or less upon a spiral spring, according to the amount of retardation of the fly wheel, and thus to regulate the throttle valve.

[Printed, 8*d*. Drawing.]

A.D. 1857, May 25.—N° 1463.

RODD, WALTER JAMES HANDSCOMBE.—(*Provisional protection only.*)—" A method of sailing or propelling a vessel or vessels " out of or on the surface of the water."

The invention consists in supporting a ship on air-tight drums with floats on them.

"Through the ship or other vessel is rigidly attached one of " the shafts which carry one pair of the drums; these drums are " loose on this shaft, so as to allow them to turn when the ship

" or other vessel is moving, thereby offering but little resistance " to its progress. The other shaft, which carries another pair of " drums rigidly attached to it, is cranked and supported by " suitable bearings in the vessel. Floats are fixed on these " drums for the purpose of propelling the ship or other vessel, " motion being given to them by steam or other motive power. " The ship or other vessel may be propelled by a screw propeller, " or it may have all the drums loose on the shafts, and the " shafts attached to the ship or other vessel, and be propelled by " paddle wheels fixed at the sides, bow, stern, or under the said " vessel, or it may be propelled by any other means used to " propel vessels. As many drums as may be deemed necessary " can be used; this, however, will be regulated according to the " dimensions of the ship or other vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 25.—N° 1465.

SHEARD, SCHOFIELD CROWTHER, and UNDERWOOD, GEORGE.—(*Provisional protection only.*)—" Improvements in sup- " plying boilers with water, generating steam, and consuming " smoke, and which said improvements are applicable to marine, " locomotive, stationary, and other boilers."

The cold water before reaching the boiler is heated by going through tubes at the bottom of the boiler flue and the back of the furnace bars and along the crown of the boiler flue.

Smoke is consumed by the introduction of air through pipes perforated with small air holes, which admit air to the back of the furnace. The smoke passes "in a tortuous course" among these pipes and is burnt by being brought in contact with the air already heated.

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 27.—N° 1506.

GRAHAME, THOMAS. — " Improvements in inland naviga- " tion."

The object of the invention is to enable boats to pass from one level to another without the use of locks.

" Two or more lines of railways are constructed on the inclines " to be overcome and where locks are situated, and the steam " engines on board the tug-boats are made with suitable gearing

“ to enable the engines to work as fixed engines (when the tug- “ boats are anchored or fixed at the top or bottom of an incline), “ and by suitable wire ropes, chains, or tackle to cause the boats “ (when run on to wheeled cradles, trucks, or carriages) to be run “ up or down the inclines; and to facilitate the passing of the “ boats on to trucks or carriages at the upper and lower parts of “ the railways, are formed below the water in such manner that “ the trucks or carriages may be run into such positions as to “ admit of the boats being floated over them. The engines on “ board the boats or vessels are arranged readily to be disconnected “ from the propelling machinery, and so as to be readily put into “ gear with the barrels, drums, or machinery at the inclines, so as “ to give motion to the same and the wire ropes worked thereby “ in like manner to when using fixed and stationary engines. “ By these means the engines on board the tug-boats or vessels “ will be continued in use when raising a succession of boats on “ the inclines in place of remaining out of use with the steam up “ whilst the fixed engines are raising the boats or vessels. On “ a tug-boat coming to an incline, it will be anchored or fixed to “ the land, and the driving tackle of the engine put into gear with “ the barrel, drum, or apparatus for actuating the wire ropes, as “ when using fixed engines at the several inclines on a canal or “ inland water.”

[Printed, *4d.* No Drawings.]

A.D. 1857, May, 30.—N° 1530.

JAMES, JOHN, and **GRIMSHAW**, WILLIAM DAYKIN.—“ Im- “ screw propeller for propelling ships or other navigable vessels “ through water.”

The “invention consists in combining an hydrostatic apparatus “ (worked on the principle of the ‘turbine,’) with a reaction “ screw propeller, for propelling ships or other navigable vessels “ through water. The hydrostatic apparatus consists of a cylinder, “ which is a receptacle for water or other liquid or fluid employed “ in the apparatus, and conveyed thereinto by a pipe “ communicating with a pump or pumps worked by steam or “ other motive power. We employ an air vessel to neutralize the “ intermittent flow of water or other liquid or fluid arising from “ the action of the said pump or pumps, as also to ensure an “ uniform supply of water or other liquid or fluid to the apparatus. “ Through the centre of the aforesaid cylinder, and in a

" 'fore and aft' direction with the keel of the vessel, a hollow shaft " (in which are two passages formed by a diaphragm or partition) " extends to the propeller aperture, passing through the 'dead " 'wood' and stern-post of the vessel, by a tube fitted with a " stuffing box. There are orifices made in the aforesaid hollow " shaft near each extremity thereof, which communicate with the " aforesaid passages therein; and to those orifices which are within " the before-mentioned hollow cylinder, are fitted and adapted a " regulating slide valve and belt, connected by two rods to a " cross-head and a reversing wheel for the purpose of giving the " 'going-a-head' and 'going-a-stern' motion to the propeller, " and for regulating the speed thereof. Within the aforesaid " cylinder, at the fore end thereof, a bearing block or cap is introduced for receiving the thrust of the propeller transmitted " through the aforesaid hollow shaft, The reaction screw propeller before-mentioned, consists of two or more threads or " blades radiating from a centre or boss, in which orifices are " made corresponding with those in the above-mentioned hollow " shaft, to which it is securely affixed, and there are curved " passages communicating with these orifices formed through the " blades of the propeller, communicating with other eduction " orifices made in the extremities of the vertical edges and other " parts of the blades, for the purpose of affording an outlet for the " water or other fluid from the apparatus and propeller."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1857, June 1.—N° 1538.

LAMBERT-ALEXANDRE, Lazare Prosper, and MALLET, Louis Pierre Felix.—" Improvements in machinery for propelling vessels."

Reciprocating frames work to and fro under water, and carry floats which feather for the return stroke by the operation of cams, rollers, and tappets.

[Printed, 8*d*. Drawing.]

A.D. 1857, June 5.—N° 1581.

CLAIR, Joseph Etienne Marie Jean.—(*A communication from Joseph Robatel.*)—(*Provisional protection only.*)—" Improvements in propelling on water and in the air."

" This invention consists in the employment of two hollow " barrels made tapering towards both ends, and surrounded by

" screw vanes or threads. The barrels are placed on each side of " a vessel or stage carrying a steam engine or other motor; " rotary motion being communicated to the screw barrels causes " them and the vessel to which they are connected to advance."

[Printed, 4*d*. No Drawings.]

A.D. 1857, June 9.—N° 1615. (* *)

NEWTON, William Edward.—(*A communication.*)—An improved life-boat consisting of " a car, vessel, or boat for receiving " goods and passengers, and which is supported upon the elevated " prow-shaped ends of two hollow closed air-tight floats. This " vessel is supported at the ends and at various points in the " length of the said floats, which are placed parallel to each other. " The car, vessel, or boat is raised on supports high above the " general surface of the water, and therefore forms a safe and " comparatively dry place for the conveyance of passengers and " goods from vessels to the shore. Between the parallel floats is " placed a paddle-wheel, which is covered in at top with a water-" tight casing, so as to keep out water from the boat. This pad-" dle-wheel may be driven by gearing actuated by manual labour. " A rudder mounted in a suitable rudder frame is also adapted to " one end of the vessel, and pumps communicating with the " interior of the hollow floats are provided for the purpose of " pumping out any water that may leak into the hollow floats."

[Printed, 6*d*. Drawing.]

A.D. 1857, June 9.—N° 1619.

BURDON, Joseph Augustus.—(*Provisional protection only.*)—" Improvements in apparatus for producing expansion in steam " and other motive power engines."

An " adjustable cylindrical gradulated cam," in connection with the slide valve, or two cams, are employed to regulate the expansion.

The cams are formed of three raised cylindrical surfaces, one being of a spiral shape on its edge, the two others with straight edges.

The projections, by means of a spring, are brought successively in contact with a pulley on an excentric rod for working the slide valve, in order to cut off the steam at the desired point of the stroke, the length of which is adjustable by a slotted lever.

[Printed, 4*d*. No Drawings.]

A.D. 1857, June 10.—N° 1634.

NEWTON, Alfred Vincent.—(*A communication.*)—"Im-
" provements in the construction and mode of propelling and
" steering navigable vessels."

A vessel with vertical sides and flat bottom is shaped like a triangle, with the vertex for the bow and the base at the stern. The vessel is steered by rudders which direct the current of air.

" The improved system of propulsion " " consists in the expul-
" sion of air from a chamber or chambers within the stern of the
" vessel, through an opening or openings extending the entire
" width of the stern below the surface of the water, by pressure,
" to which the said air is subjected by a compression pump or
" pumps, or which is developed by its expansion by heat, such air
" in its escape acting on an area of water almost equal to that of
" the greatest submerged section of the vessel. This system of
" propulsion also consists in certain provisions for expelling air
" in a forward direction from the vessel, to act on the same prin-
" ciple as above stated, for the purpose of propelling the vessel
" in a backward motion."

[Printed, 8*d*. Drawing.]

A.D. 1857, June 12.—N° 1653.

CARLEMAN, Carl Gustaf.—(*Provisional protection only.*)
—" Improvements in submerged propellers for propelling
" vessels."

" This invention has for its object improvements in submerged
" propellers for propelling vessels. For this purpose the stern
" post or hinder part of a ship is made with an opening through it
" to receive the propeller, and such opening is larger at the two
" ends than at the intermediate part, in order that the arms,
" which are comparatively narrow, may rotate within the narrow
" portion of the opening, and that the blades of the propeller,
" which are wider, may rotate through the larger parts of the
" opening; and the two outer ends of the opening are still wider
" than those parts where the blades pass, in order that blades or
" portions of cylinders which are fixed in angular directions on
" to the outer ends of the propeller blades, may pass freely
" through such opening. The propeller blades, which, it is pre-
" ferred, should each be a part of a screw (but this is not essen-

" tial), are fixed on to arms, which are also preferred to be parts " of a screw; and at the outer ends of each of the propeller " blades is fixed horizontally, or at right angles to the blade, " another blade which it is preferred should be part of a " cylinder."

[Printed, 4*d.* No Drawings.]

A.D. 1857, June 13.—N° 1662.

MARCH, CHAPMAN.—(*Letters Patent void for want of Final Specification.*)—" Improvements in obtaining motive power."

The "attractive and repulsive" power of the sun is employed by a shaft and horizontal wheel carrying magnets and pieces of steel, but the manner of action is not described. It is stated to be useful in propelling ships. Reference is made to No. 1880, A.D. 1856.

[Printed, 4*d.* No Drawings.]

A.D. 1857, June 22.—N° 1739.

FONTAINEMOREAU, PETER ARMAND LE COMTE DE.—(*A communication.*)—(*Provisional protection only.*) —" An improved " propeller."

" This invention consists in propelling boats and other vessels " by means of paddles acting obliquely in the water. This im- " proved propeller may be used as a substitute for water wheels, " for winnowing grain and for other purposes. The propeller " is composed of two or more wheels placed obliquely at the sides " or stern of the vessel, which wheels are connected together by " rods, having the paddles attached to them, so that when the " wheels are put in motion by levers worked by hand, or by other " motive power, the paddles enter the water in an oblique direc- " tion and thus give motion to the vessel."

[Printed, 4*d.* No Drawings.]

A.D. 1857, June 26.—N° 1795.

BOURNE, JOHN.—" An improved steam train for navigating " shallow rivers."

Boats are attached in trains by articulating the bow of one to the hollow stern of the next. They are propelled by screws or paddle wheels at the sides or bows which act on the water or bottom, or by jets of water, and the train is steered by altering the position of the boats at the articulated joints. A paddle wheel or two screws at the bow stirs up the sand to clear a passage. The remainder of the invention is not connected with this series. A pole may be lowered at the stern of the last boat to hold it back when the train descends a rapid stream.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1857, June 26.—N° 1802.

GAUDRION, Stanislas.—(*A communication from Jules Vergne.*) —" Improvement in screw propellers."

The inventor says,—

" My invention relates to improvements in screw propellers for " vessels, which improvements are intended to prevent the mole- " cules of water struck by the screw from passing towards the " periphery by yielding to the centrifugal force, and from pro- " ducing prejudicial eddies. I obtain these results by means of " grooving or fluting the surface of the screw, instead of using " a plain surface as usual. By fluting the surface of the screw, " I mean making grooves in the body of the metal, or the " grooved surfaces may be produced by means of raised ribs " affixed to the screw surface, which ribs may be either inclined or " curved towards the centre of the screw, or the reverse, or stand " at right angles to the face of the screw. I form these grooves " on the surface of the screw, either in the direction in which the " screw is generated, or they may be at angles, or inclined " thereto, as may be most desirable. In making flutings or pro- " jecting faces in the solid of the screw, I prefer that the screw " face should lean forward a little, in order that rising surfaces " may be formed thereon in the form of a series of steps rising " one above the other, as they approach from the centre towards " the periphery."

[Printed, 6*d.* Drawing.]

A.D. 1857, July 1.—N° 1836.

MURRAY, George.—(*Provisional protection only.*)—" Improve- " ments in machinery or apparatus for propelling ships and " vessels."

Cylinders are arranged horizontally, parallel with the keel of a ship, and water is drawn in and expelled by pistons and valves so as to produce a constant stream for propulsion.

[Printed, 4*d.* No Drawings.]

[illegible] July [illegible]—N° 1846.

[illegible] from William H. Elliot.) [illegible] engine governor."

[illegible] water outside a vessel has a flexible [illegible] to rise or fall by the action of [illegible] to move a rod above it which acts on [illegible]

[illegible]

[illegible] July 8.—N° 1903.

[illegible] (Provisional protection only.)—"Improvements [illegible] navigable vessels and the propelling [illegible]

[illegible] screw propeller are raised and lowered to suit [illegible] the water. "This is done by having an adequate [illegible] the stern-post." When the screw is abaft [illegible] makes "the corresponding arrangements [illegible] and after shaft bearing." The same object may [illegible] partially lowering and raising the entire of the [illegible] which is set the after part of the screw shaft, rudder, [illegible] The screw may be raised on deck "by means of [illegible] frame.

[illegible] No Drawings.]

A.D. 1857, July 9.—N° 1905.

STEWART, CHARLES PATRICK, and HOPE, DAVID GRAHAM. "Improvements in the valve gear of locomotive and other "engines."

An excentric carries a clip which is free to move in a horizontal direction, but not to turn with the shaft, while its fore part has a slide bar and a brush linked to the reversing arm and to the valve rod, so that the valve rod end moves in the required radius while the brush moves on the slide bar in a straight line. The arrangement is simplified for a curved slide.

The action of the above-mentioned excentric is transmitted through two excentric rods to the opposite ends of a link.

Motion is given to the slide bar from the piston rod, cross head, or connecting rod, leaving the crank shaft free and without an excentric.

Several modifications are described for engines of particular kinds by the use of intermediate or auxiliary shafts or of cog wheels, also for causing the action of two excentrics when close together, in inside cylinder engines to correspond.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, July 9.—N° 1910.

BROOMAN, Richard Archibald. — (*A communication.*) — (*Provisional protection only.*)—" An improvement in propelling " ships, boats, and other vessels."

Two horizontal wheels revolve in opposite directions under water on each side of the vessel on vertical shafts, so that their peripheries nearly touch. A half drum or case encloses one part of each wheel, and floats carried by it act on the water for propulsion. One such wheel may be used.

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 16.—N° 1976.

DEFIS, Guillaume.—" Certain improvements in preventing " incrustation in boilers."

A paste is compounded of potash, plumbago, tannin, sulphur, and other ingredients in certain proportions, and is introduced into the boiler by a funnel and box with slides whence it passes through pipes to the boiler. One supply will prevent incrustation for several days.

[Printed, 6*d*. Drawing.]

A.D. 1857, July 17.—N° 1981.

RUSSELL, Joseph, SPRATT, Henry William, and PRESS, William.—" A certain new method or methods, or new improve- " ment or improvements in the construction, application, and " use of machinery for propelling boats, ships, or vessels of any " class or denomination."

A blade in a frame traversing back and forward along the side of a vessel has vertical play so as to rise out of the water and to be lowered to a proper depth. The blade is kept in a vertical position during its course, and is moved by a stud upon it which is worked by an endless chain over two wheels, one of them being moved by steam or other power.

[Printed, 1*s*. Drawing.]

A.D. 1857, July 17.—N° 1984.

JOHNSON, John Henry.—(*A communication.*)—" Improve-
" ments in steam boilers."

The cylindrical central flue of a cylindrical boiler is covered at the inner end by a concave cup rivetted to a flange extending beyond the surface of the flue. Tubes are open at the inner ends so as to communicate with the flue and at their front ends with the smoke box. The draught is therefore along the flue and back by the tubes. The flue and tubes can be removed in a compact body together for repair or for cleaning.

Various arrangements for the air pump and other parts, are detailed in the description with the drawings.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, July 20.—N° 2004.

MARYÓN, Robert James.—(*Provisional protection only.*)—
" Improvements in the construction of propellers, and in arrange-
" ments of engines for working the same for propulsion of ships
" or vessels."

The propulsion is effected by cylinders projected and withdrawn under water through bearings in the run of the vessel. In a drawing one of these double trunk propellers is shown at an angle of 45° to the vertical.

[Printed, 8*d*. Drawings.]

A.D. 1857, July 21.—N° 2013.

MOHR, Josef. — (*Provisional protection only.*) — " Improved
" machinery for propelling vessels."

Water from outside a vessel is admitted to a turbine on a vertical shaft. "Now upon communicating motion to the turbine
" the water will be rapidly whirled round the case and be
" ultimately expelled with great force down a channel extending
" from the casing to the stern or other convenient part of the
" vessel," and this stream of water is to propel the vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 24.—N° 2029.

BURROWS, James.—"Improvements in steam engines."

The water used for injection, together with that in the condenser, after going to the hot well, is cooled by passing through or among tubes kept cold by the external water, and thus it may be used over and over without producing incrustation.

[Printed; 8*d*. Drawing.]

A.D. 1857, July 31.—N° 2079.

LIMBERT, James Alfred.—"Improvements in marine steam "engines."

The invention comprises the following features:—

Two piston rods diagonally placed one on each side of the crank, one above and the other below the crank shaft.

The condenser apparatus on the opposite side of the crank shaft to that of the steam cylinders.

The air pump of each cylinder worked direct from the steam piston by a rod through the cylinder cover.

Arrangements of the port valves and delivery valves.

The slide valves worked by a weigh shaft in a single long bearing.

The expansion valve gearing between the engines.

The starting gear worked by a horizontal wheel.

The throttle blows through expansion valves, and injection cork handles combined with the starting gear levers and the pressure and vacuum guages.

A high hot well between the condensers and air pump.

T shaped pipes leading to both cylinders from a single steam pipe, with a disc in the exhaust pipe for closing the communication between the two engines.

[Printed, 1*s*. Drawing.]

A.D. 1857, August 6.—N° 2124.

ROWLAND, Ellis.—"Improvements in steam engines."

The piston consists of a long plunger, or of two pistons at an interval on the piston rod, and between them the connecting rod is attached to the piston by a rod which works in a slot on the cylinder's side, which slot is covered steam-tight. The piston rod is continued at both ends so as to carry two other pistons of the pump.

[illegible]

[illegible]

[illegible]

[illegible] protection mill.—" Improve[illegible]

[illegible]

[illegible]

[illegible] improvements in the construction of [illegible] beacons, floating lights, and other [illegible]

[illegible] regulating the position of a body, beacon, [illegible] floating beacon or body, when moored or at [illegible] sea, the inventor has invented [illegible] self-acting brake," and "a self-acting [illegible] self-acting brake consists of a structure of wood or iron, or other material, in the form of a shutter or door, so fitted as to retard the motion of the vessel when she is struck by a sea. "The self-acting screw or paddle consists of a screw or "paddle wheel, fixed beneath or within the floating vessel or body, "and partly or wholly submerged, so that when the floating vessel "or body obtains backward motion (as when it is struck by a "sea on its fore part or bows), the screw or paddle wheel will be "made to revolve by the pressure of the water. The screw or "paddle wheel works on an axle, which is connected with springs "or weights within the floating vessel or body in such wise that "when it is made to revolve by pressure of the water, these "springs or weights become tightened or compressed, or drawn "up respectively, and remain so until the pressure exercised by "the water has ceased, when the screw or paddle wheel is made "to revolve again by the action of the springs or weights (but in "an opposite direction), until the springs or weights have resumed "their original state of tension or condition of rest, so that the "floating vessel or body may by the second action of the screw or "paddle be immediately brought back to its first position."

[Printed, 10*d*. Drawing.]

A.D. 1857, August 25.—N° 2246.

JAMES, Charles Clement.—(*Provisional protection only.*)—"Improvements in propelling vessels."

Pistons in cylinders under water are connected with the steam pistons, and each stroke of the latter is thus made to act directly upon the water and propel the vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1857, August 25.—N° 2250.

PENN, John.—"An improvement in apparatus for taking the "thrust of screw and submerged propellers."

The thrust of the screw propeller is received on a disc furnished with pieces of wood which protrude beyond its surface and bear upon a truly turned metal plate. The propeller shaft turns freely within this disc. The disc may be fixed on the stern post or on the boss of the propeller, in which case the wood will turn with the propeller.

[Printed, 10*d*. Drawing.]

A.D. 1857, August 27.—N° 2270.

LÖBNITZ, John Henry Christian, and HENDERSON, James McLintock.—" Improvements in steam engines."

The cylinders are vertical or set diagonally, and in pairs, each pair working a cross head and connecting rod, and acted on by one set of valves. The "foundation" upon which the pairs of cylinders are disposed, " is arranged to form a surface condenser," open to the sea. One of several boilers may be blown off while the others are working.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1857, September 8.—N° 2344.

GEACH, William.—" Improvements in machinery for propelling vessels."

A cylindrical case is fixed under water (the axis of the cylinder being vertical) and a wheel with float boards is caused to revolve inside and to eject the water entering by an opening in the bottom so as to propel the vessel. The case may be turned round so as to cause the stream to issue in a direction required for steering.

[Printed, 6*d*. Drawing.]

A.D. 1857, September 9.—N° 2348.

HÉDIARD, Alexander, and LEVIEUX, Sénateur.—(*Provisional protection only.*)—" An improved boiler for generating steam."

Water is forced into a series of small tubes and between surfaces close together, so as to divide it into thin layers, while the furnace heats the tubes and surfaces so that the water will be immediately transformed into steam.

Another set of coiled tubes is also described, through which heated air passes for superheating the steam circulating round the outside of the coils.

[Printed, 1*s*. Drawings.]

A.D. 1857, September 19.—N° 2437.

JAMES, William Henry.—" Improvements in steam vessels, parts of which improvements are applicable to sailing and other vessels."

The hull of a vessel is formed of two or more cylinders side by side, or arranged in tiers, or of skeleton frames of cylinders covered with planks. The paddle wheels have enclosed sides or divisions with floats in them, arranged so as to be alternate with those adjoining.

[Printed, 8*d*. Drawing.]

A.D. 1857, September 21.—N° 2443.

JOLY, Pierre François.—" Improvements in apparatus for " generating and superheating steam."

The steam is first generated in tubes over the furnace, which have their back ends resting on the bridge, while water is injected into the tubes from a feed pipe. The steam is then passed to another set of tubes to be superheated, and, if necessary, to additional sets until it is conducted into a steam reservoir. The generating and the superheating tubes are connected in corresponding sets, and small dipping tubes may be used for conducting the water and steam from one set to another. Various means are also described for establishing connection between the sets of tubes by a double metal plate.

[Printed, 10*d*. Drawing.]

A.D. 1857, September 21.—N° 2446.

PICOT, Louis François.—(*Provisional protection only.*)—" Im- " provements in salinometers or instruments for indicating the " saturation of water in marine boilers."

The hydrometer or similar instrument rests in the inner tube of a double tube, and the water enters from the boiler into a small dome chamber and passes through the gallery or frame into the outer chamber all round and also into the inner chamber through perforations in the inner tube. The instrument is thus rendered steadier.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 21.—N° 2447.

OWEN, Edmund Lloyd. — (*Provisional protection only.*) — " A new or improved method of propelling vessels."

A band or plate of metal at the side or near the keel, and sometimes enclosed in a tube, has an undulating motion given to it by a motive power engine to propel the vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 22.—N° 2454.

HENRY, Michael.—(*A communication from Robert Tissot.*)—(*Provisional protection only.*)—"Improvements in the mode of "transmitting motion, especially applicable to apparatus employed in navigation."

The screw propeller shaft is in two parts, connected by a link, so that the screw can be worked in various positions, and used for steering the ship.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 22.—N° 2458.

RENNIE, George.—Improvements in vessels for war and revenue purposes.

(1.) The disposition of the weights and compartments in an iron vessel.

(2.) Two screw propellers alone or in conjunction with other propellers.

(3.) The cylinders of the various engines working the same shaft are arranged "in a manner diagonally in the plan" so as to economize space, the port cylinder working the starboard screw propeller shaft, and *vice versa*.

(4.) Coal bunkers on each side of the boilers, and projecting so as to protect them.

[Printed, 8*d*. Drawing.]

A.D. 1857, September 22.—N° 2462.

BYLANDT, Alfred, Count de.—(*Provisional protection only.*)—"Improvements in propelling ships or other navigable vessels."

Air is forced into the water between plates inclined to each other. These plates are fastened to the bottom of the ship and have pipes leading to the spaces between them. To propel the vessel astern a screw is used.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 25.—N° 2478.

GREGORY, James, and CRAYMER, William.—(*Provisional protection only.*)—"Feathering and adjusting screw propellers "to be used in propelling vessels."

The screw propeller shaft is made hollow, and a second shaft goes through it carrying worm threads, which act on the propeller blades so as to feather them to the angle desirable.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 26.—N° 2483.

BALBONI, PASCAL.—(*Provisional protection only.*)—"A marine, "submarine, and aerostatic propeller, being a new mecanism for "propelling steam vessels on and in the water, applicable also "to aerostatic purposes, combining speed and safety in steam "boats, and giving the power of directing balloons."

A blade of a triangular or sector shape attached to a shaft is caused to strike the water by the revolution of the shaft, and then instead of completing the circle the blade when horizontal slides along a groove in the shaft and again plunges into the water. The propeller is termed the "aile nageoire."

[Printed, 6*d*. Drawing.]

A.D. 1857, October 8.—N° 2578.

REUVER, DANIEL.—(*Provisional protection only.*)—"Improvements in propelling and steering ships and other floating "bodies."

Hinged wings or flaps are caused to move back and forward in the water, and they open when moving in one direction, but are closed when acting on the water to propel the vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 12.—N° 2609.

CALVERT, WILLIAM.—"Improvements in obtaining motive "power by the action of the wind."

A framework carrying triangular sails is caused to turn round a vertical mast by the action of the wind. Each sail is fastened at the foot to a yard, and its position is regulated by a barrel and endless chain so that the wind may act on the sails only on one side of the mast. The motive power thus obtained drives the propeller shaft by means of gearing.

[Printed, 10*d*. Drawing.]

A.D. 1857, October 14.—N° 2622.

KOPISCH, C. G.—(*Provisional protection only.*)—" Improve-
" ments in propelling vessels by means of heated air without
" screw or paddle, thereby saving fuel and ships' room."

Cold air is blown by a blowing machine into the furnace, and after being heated and expanded is forced into the water to propel a vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 19.—N° 2677.

PATRIDGE, DAVID.—" Improvements in shaft bearings."

The bearings of the screw propeller shaft are improved by coating the shaft with tin or soft metal, which is attached by running it into a mould round the shaft already tinned at the part required.

[Printed, 6*d*. Drawing.]

A.D. 1857, October 28.—N° 2734.

SLOPER, JOSEPH.—" Improved means of and apparatus for
" obtaining motive power for propelling ships or driving
" machinery."

A series of vanes or moveable arms are arranged round a vertical shaft, and are so set by eccentrics or other means as to cause the shaft to rotate by the action of the wind. Sometimes the vanes are formed of laths, which may be folded as a Venetian blind. The power thus obtained actuates paddle wheels or other propellers.

[Printed, 10*d*. Drawing.]

A.D. 1857, October 31.—N° 2765.

GALLOWAY, GEORGE BELL.—" Improvements in the con-
" struction of merchant ships and other vessels, in motive powers,
" propulsion, and boiler furnaces."

The engine used for motive power is called a " planet motion." " Air, water, or steam " is directed against " arms or buckets " on the inner circumference of a rotatory cylinder. Rollers surround the cylinder to diminish the friction. Propulsion is also effected by the following means:—A pipe from the bows communicates with a cistern. As the ship plunges, water is driven through the pipe into the cistern. When the cistern is full the water overcomes the resistance of valves with powerful springs, and is admitted to air pipes to "produce its propulsive effect. A hydraulic engine and an air pump are also to be used.

A "fish-fin" propeller is described; it "consists more par-"ticularly in being broadest at the boss," which "is made "much longer and in a direct line with the shaft." "The speed "of the engines and their form resemble the fished fin." Two of these propellers are fixed on the same shaft. The "fishes "tail" propeller "is constructed by inserting and affixing flat "metallic springs in a socket which is attached to a shaft," made "mechanically to vibrate or oscillate."

In boiler furnaces an additional fire-place is used, through which the smoke from the furnace passes and is consumed. An "air channel" is fixed before the furnace, from which pipes pass to the hollow fire-bars and "fire-door frames." These pipes may be disconnected. A hopper is fixed above the fire-doors. Link bars are used to move the fire-bars. Reference is made to No. 796, A.D. 1856.

[Printed, 8*d*. Drawing.]

A.D. 1857, November 3.—N° 2786.

FONTAINEMOREAU, Peter Armand le Comte de.—(*A communication.*)—(*Provisional protection only.*)—"Improvements "in marine or condensing steam engines."

The air pump is double, and one action exhausts the water while the other removes the air.

The waste steam condensed into water issues in a stream to propel the vessel.

An exhaust pump with a weighted piston is used to remove the bilge water.

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 4.—N° 2805.

MILLER, Joseph. — "An improved arrangement of marine "steam engines."

The cylinder is in an inclined position, and the pistons of horizontal pumps are worked from the piston head of the engine, by short connecting rods or links therefrom to the end of a bell-crank lever on a rocking shaft carrying other arms by which the pistons of the pumps are worked.

[Printed, 10*d.* Drawing.]

A.D. 1857, November 6.—N° 2820. (* *)

MACNAB, WILLIAM.—This invention has for its object "im-
" provements in vessels propelled by screw or other similar pro-
" pellers, so as to render such vessels more suitable for use in
" shallow water. For this purpose the vessel is fitted to receive
" two propellers, mounted on two shafts laid parallel to each
" other, and these propellers may be of such a size as either to be
" totally submerged or only partially so, as may be preferred. In
" order to adapt the vessel to receive these propellers in such a
" way that they may be protected from injury from floating bodies
" or otherwise, it is constructed with two stern posts, and it is
" between these two stern posts that the propellers are placed.

" In order that the water may not be obstructed in its passage
" to the propellers, the vessel is arranged so as to draw less water
" at the stern than elsewhere; but the stern posts descend to the
" full draft of the vessel, in order that the rudders (of which
" there are two, one on each stern post) may have sufficient
" power.

" In constructing large vessels, but which are to have a small
" draft of water, I sometimes form them with three stern posts,
" one at the centre line of the vessel, and another on each side of
" this central post; in this case I may employ four propellers,
" two in each of the openings between the stern posts."

[Printed, 10*d.* Drawing.]

A.D. 1857, November 9.—N° 2830.

PINKER, JOHN.—(*Provisional protection only.*)—" Improvements
" in governors for marine steam engines."

A weighted lever which " constantly tends to hang in a perpen-
" dicular position," acts on the throttle valve according to the changes in the position of the vessel as it pitches on the sea.

[Printed, 4*d.* No Drawings.]

A.D. 1857, November 9.—N° 2835.

REEVE, JOHN.—(*Provisional protection only.*)—" Improvements
" in propelling vessels."

The propellers have surfaces which expand and collapse in the forward and back strokes, and are connected with the piston of the steam engine by "lazytongs" levers, so as to increase the length of their stroke beyond that of the piston.

[Printed, 4*d.* No Drawings.]

A.D. 1857, November 16.—N° 2874.

SPENCER, John Frederick.—"Certain improvements in "steam engines, and in the apparatus connected therewith."

The deficiency in water from the steam condensed after working an engine is supplied by an auxiliary boiler in which sea water is used.

The metallic surface condensers are formed of galvanized iron, with india-rubber rings on the joints where the tubes enter the tube plates, and the steam is conducted several times through the chambers.

Steam jackets may be supplied from the auxiliary boiler.

The air pump and the pump for supplying condensing water, are combined in one chamber by making its piston a trunk or by arranging the valves.

[Printed, 1*s.* Drawing.]

A.D. 1857, November 18.—N° 2892.

GERMANN, Andrew Frederick, GERMANN, Frederick Gustavus, and GERMANN, Joseph.—"An improved pro-"peller."

The propeller is submerged. A rectangular shaped vane on a rotating shaft is so directed by a link bar connected to a shaft moving through part of a circle, as to be feathered during the return stroke through the water. A plane surface "always "rectangular in form, is hinged on one of its sides to an upper "and lower arm of equal length." "They move freely on fixed "axes, and are placed hindermost; the other side of the pro-"pelling paddle plane or blade revolves freely on two other "arms" shorter than the first pair, and placed before them. The uppermost of these is the driving arm; the lower is "free "on its own axis, and works in a centre on the frame." Another mode of connection enables two vanes to be similarly employed.

[Printed, 6*d.* Drawing.]

A.D. 1857, November 25.—N° 2945.

MARTIN, ANTOINE and MARTIN, JEAN.—" Improvements in " cleaning and in preventing the formation of deposits and " incrustations in steam boilers."

A composition to prevent incrustation is introduced into the boiler containing the following ingredients:—Crystallized carbonate of soda, wood ashes, plumbago or coke or pumicestone. Another compound is added if the boiler already has incrustations, and this contains hydrochlorate of ammonia. The mixture may be introduced by a vessel over the boiler into which the steam is allowed to force water, which afterwards descends together with the compound.

[Printed, 6*d.* Drawing.]

A.D. 1857, December 2.—N° 2992.

THOMSON, WILLIAM.—(*Provisional protection only.*)—" Improvements in machinery or apparatus for propelling ships or " vessels."

A bar carrying propellers is moved horizontally back and forward in the water, its length being in the direction of the keel. Each vane or propeller folds up so as to feather on the return stroke.

[Printed, 4*d.* No Drawings.]

A.D. 1857, December 3.—N° 3002.

REEVE, JOHN.—(*Provisional protection only.*)—" Improvements " in propelling vessels."

A propeller at the end of the longer arm of a lever is actuated directly by the piston. It has thus a longer stroke than the piston of the steam engine at the end of the shorter arm.

[Printed, 4*d.* No Drawings.]

A.D. 1857, December 12.—N° 3061.

PARKER, JAMES.—(*Provisional protection only.*) — " A novel " application of steam power for the movement of vessels or other " bodies floating on or suspended in water, air, or other fluid, " and for moving machinery and propelling solid bodies on land."

Steam acts on vanes to turn a shaft, while the "recoil power," as it issues through an opening, is to be used (in a manner not described).

[Printed, 4d. No Drawings.]

A.D. 1857, December 23.—Nº 3152.

MURRAY, JOHN.—(*Provisional protection only.*)—"Improve-" ments in propelling ships and vessels."

"The paddles consist of water-tight hollow gradients of a " cylinder" at the stern of the vessel, and caused to oscillate alternately within a concave surface of rather larger radius than that of the paddle.

[Printed, 4d. No Drawings.]

A.D. 1857, December 28.—Nº 3169.

BARLING, JOHN.—"An improved paddle for propulsion on " water."

Two floats on a shaft are kept always vertical by arms on each connected with a pin turning as an eccentric. The floats may be protruded or withdrawn on the arms supporting them. Another arm and a stop act so as to allow the float to yield or feather temporarily, when a strain comes upon its forward surface under water.

[Printed, 10d. Drawing.]

1858.

A.D. 1858, January 7.—Nº 29.

PHILP, RICHARD, and PHILP, JOHN.—"An improvement in " propellers for propelling ships, boats, and other vessels in " water."

The opposite blades of a screw propeller are so placed, that lines along corresponding edges of each blade meet in the axis of the propeller, while the crowns of the blades are at equal distances from the stem, and "the plane of direction of each blade" passes as near as may be, free of the plane of direction of the opposite one during rotation.

[Printed, 6d. Drawings.]

A.D. 1858, January 8.—N° 33.

RAYMOND, Henry.—(*Provisional protection only.*)—"Im-" provements in propelling ships or vessels."

Pistons in submerged cylinders act on the water, while they have a vacuum behind in the cylinders.

[Printed, 4*d.* No Drawings.]

A.D. 1858, January 9.—N° 42.

CHAUFOUR, Jules Alphonse Mathieu.—"Certain im-" provements in the construction of axle boxes and axle " bearings."

The invention relates to the bearings of shafts of various kinds, some of which arrangements are suitable for screw propelling shafts.

These comprise friction collars, rings, adjustable shells, a wedge to allow the introduction of packing cylinders, an arrangement of grease reservoirs and a tightening screw, all of which are explained in the drawings, but some of them are specially applicable to steam engines.

[Printed, 10*d.* Drawing.]

A.D. 1858, January 12.—N° 49.

JOHNSON, John Henry.—(*A communication from Edme Augustin Chameroy.*)—(*Provisional protection only.*)—"Improve-" ments in boilers and heating apparatus generally."

The principal feature of the invention is the use of metallic tubes or capsules closed at one end and open at the other. These communicate directly with the body of the boiler through one or two apertures, and they may be applied to an ordinary tubular boiler, or may be arranged round a central tube so as to expose their surfaces to the heat.

[Printed, 4*d.* No Drawings.]

A.D. 1858, January 29.—N° 162.

ELDER, John.—"Improvements in the arrangement or con-" struction of steam engines and boilers."

The invention relating to engines consists in placing three cylinders to work together, the steam from one at high pressure entering the two others at low pressure, so that the two pistons and the single one act at opposite ends of cranks in the same diametrical plane.

The invention relating to boilers consists in causing the water and the furnace product, to pass through tubes spirally turned, so as to be nearly contiguous.

Various modifications are explained, but the drawings are required to make them intelligible. Steam jackets extending through the cylinder covers may be used.

[Printed, 2*s.* 8*d.* Drawings.]

A.D. 1858, February 5.—N° 214.

COLLINGWOOD, Edward and COLLINGWOOD, Thomas.—"Certain improvements in machinery or apparatus for pro-" "pelling vessels on water."

(1.) Feathering paddle wheels. Each vane can turn about the axis of the arm supporting it, and which is fixed in the boss of the wheel. The vane is caused to turn flat to the water and then edgeways, either while submerged or on emersion, by cams or excentric guides acting upon rods.

(2.) Feathering reciprocating paddles. These are caused to vibrate in a vertical plane and to turn or feather during the return stroke by curved guides, with a similar action to that described above.

[Printed, 1*s.* Drawings.]

A.D. 1858, February 8.—N° 227.

WILSON, Robert.—(*Provisional protection only.*)—"Improve-" "ments in propelling navigable vessels." Screws or other submerged propellers are so attached to a framework as to be worked at the sides of a ship, while the frames can be lowered or raised along grooves, and the shafts may be driven by endless bands. The propellers and frames are removeable.

[Printed, 4*d.* No Drawings.]

A.D. 1858, February 9.—N° 241.

PRINGLE, George.—(*Provisional protection only.*)—"Improve-" "provements in machinery or apparatus for propelling ships or" "vessels."

In paddle wheels the float boards are arranged upon their respective carrying arms at an acute angle therewith, the apex of this angle being in the direction of the ship's motion, while the " open end of the angle is towards the stern of the vessel."

A " secondary propeller is attached to the extremity of the " blade of an oar," " so as to increase the hold of the oar upon " the water," but the description of this is not given with particularity. A "wheel with angular float boards" may be used besides, or instead of, the propeller.

[Printed, 4*d*. No Drawings.]

A.D. 1858, February 12.—N° 269.

NEVILLE, Thomas, and DORSETT, William Smith.—" Improvements in steam boilers or steam generators, and in " steam engines."

Water heated to the boiling point is injected at intervals in a divided stream, into a highly heated steam generator, from which the steam passes through heated tubes to the cylinders.

The fly wheel of the engine is horizontal upon a vertical axis, so as to save space in certain cases.

[Printed, 8*d*. Drawing.]

A.D. 1858, February 19.—N° 319.

GRIFFITHS, Robert.—" Improvements in screw propellers and " apparatus for governing engines used to give motion to screw " propellers."

The screw of a propeller is so constructed that if a straight edge is held against the blade and perpendicularly to the length of the axis " it will be found that at a point at a distance from the " axis (generally of about half the radius of screw) the straight " edge and the blade part company, the blade falling forward " toward the ship, or the screw may be so constructed that the " blade shall continually fall away from a straight edge so " applied." The pitch of a blade is altered by removing keys and filling pieces which retain its arm in the boss, and replacing them at the altered pitch.

A regulator for governing the engine according to the varying depth of water at the stern in pitching is formed by allowing the external water to enter a tube, and by its rise and fall to work a throttle valve.

[Printed, 1*s*. Drawings.]

A.D. 1858, February 20.—N° 339. (* *)

CATLIN, George.—(*Provisional protection only.*)—" The im-
" provements in the mode of constructing and propelling ocean
" and other steamers (from which I denominate them 'grooved
" and submotive,') " consist in " a groove which I propose in the
" hull of the vessel, passing under its centre from the bow to the
" stern, and into which groove and through the after part of it, a
" strap with paddles or buckets is delivered through the hull of
" the vessel by an upright wheel acting above and near the centre
" of the deck, the said strap and paddles or buckets being lifted
" by another wheel at the stern, thereby getting the full and
" steady power of the engine to act upon the solid and unbroken
" water by the buckets passing through the groove entirely below
" the water line." The hulls of such vessels are " to be con-
" structed solid, with timbers or of iron, and " cellular " or hollow,
" as the case may be, with the view to the increasing of speed
" and lessening the dangers to property and life."

[Printed, 4*d*. No Drawings.]

A.D. 1858, February 27.—N° 392.

CAVE, William.—(*Provisional protection only.*)—" Improve-
" ments in apparatus for propelling vessels, carriages, and
" machinery."

A wind wheel is used for propelling vessels by the action of a screw or paddles. The plane of each vane is parallel to the axis of the wheel, and if found requisite, one half of the wheel may be enclosed in a moveable case.

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 11.—N° 487.

DAVIES, George.—(*A communication from Mortimer M. Camp.*)
—" Improvements in life-boats."

A life-boat (of which other features also are described) has a screw propeller in the deadwood astern, and this is driven by gearing worked by rods with handles so as to enable several persons to assist at once.

[Printed, 8*d*. Drawing.]

A.D. 1858, March 13.—N° 509.

CARTER, George.—(*Provisional protection only.*)—"Improvements in steam engines and machinery for propelling vessels "and other bodies in water and other purposes."

An air pump is described, formed of four concentric cylinders, the space between them being filled with mercury in such a way as to form "an air-tight or gasometer joint." By these pumps air may be forced to propel vessels in a way not stated. Reference is made to No. 1178, A.D. 1856.

[*Printed, 6d. Drawing.*]

A.D. 1858, March 15.—N° 528.

HAMILTON, John, junior.—"Improvements in apparatus for "propelling vessels."

At the sides of a vessel are two drums on horizontal axes. A chain with curved float-boards passes round these, and as one of them is caused to revolve the floats act on the water. One of the drums is placed higher up than the other, so that the floats are lifted out of the water during their progress.

[*Printed, 10d. Drawing.*]

A.D. 1858, March 18.—N° 550.

FLETCHER, Lavington Evans.—"Improvements in marine "engines and boilers, and their appurtenances."

An artificial draught is supplied to the furnaces by forcing air into the stoke hole, and maintaining a high pressure there. An engine having a surface condenser, is combined with a tubular boiler, provided with a mechanical arrangement for producing a draught in the furnace. An engine having a surface condenser is combined with a tubular boiler having an inverted bridge beyond the ordinary bridge for producing a draught. To supply the waste of distilled water, an additional engine is used driven by steam from a separate boiler which exhausts into the main boiler. The cylinders and pistons are heated, and the waste of water supplied by introducing steam from an auxiliary boiler. A heater filled with water is applied to the cylinder or piston. A tubular boiler with mechanical means for producing draught, is combined with an engine having a surface condenser and cylinders heated as above. A steam engine of this sort is combined with boilers of the various sorts described. A syphon well supplies the boilers.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1858, March 20.—N° 582.

BROWNE, PATRICK. — (*Provisional protection only.*)—" Im-" provements in the screw propeller, partly applicable to the " raising of fluids."

In a screw propeller two of the four blades are moveable, so as to be placed behind the others when it is required to form only two blades. The blades may be linked at any angle with those adjoining, and may be coupled. They may be convex, plane, or concave.

In the bearing of the shaft the brass has a lateral and vertical play by a universal joint arrangement, so as to diminish wear and tear.

[Printed, 4*d.* No Drawings.]

A.D. 1858, March 24.—N° 620.

BIDDELL, GEORGE ARTHUR, and BALK, WILLIAM.—" Im-" provements in steam boilers."

The invention relates to an arrangement whereby the tubes of steam boilers may be so connected with the shell that they may readily be disconnected and removed for cleaning or repairing. This is described as being done by having angle iron rivetted to the front end of the shell truly faced, and forming a good steam joint with the front plate, and by means of a ring on the inside face of the back tube plate; but the particulars of this construction can only be intelligible by a consideration of the drawings annexed to the Specification.

[Printed, 10*d.* Drawing.]

A.D. 1858, March 29.—N° 661.

SPENCER, JOHN FREDERICK. — " Improvements in marine " engines."

An injection condenser is combined with a surface condenser, so that the air pump may be attached to either as desired.

The air pump and steam cylinder are solidly connected together in the same line.

An additional piston rod is used, of such a size as that the area of the piston is lessened so as to equalise the pressure on both sides.

Auxiliary boiler power is supplied for engines working the pumps at high pressure.

[Printed, 1*s*. Drawings.]

A.D. 1858, April 3.—N° 705.

GÁCHE, VINCENT, aîné.—"An improvement in the construction of steam engines for the use of vessels."

The condenser is placed above the driving shaft of the engine; so that the water from it does not require a high lift.

Air pump valves in the condenser are of india-rubber, turning on a spindle, and not by their flexure.

The feed pump piston is an integral part of the piston of the air pump.

Reversing gear is used, consisting of an "undulated" cog wheel (seemingly like a ratchet wheel, but not clearly described or shown in the drawings), moveable on the driving shaft, and detained by checks.

The steam pistons may be removed by taking off the bottom of the cylinder, and by taking off the sight plate the bottom valves of the air pump may be got at; and in a similar manner the upper valves and the valves and piston of the feed pump.

[Printed, 10*d*. Drawing.]

A.D. 1858, April 3.—N° 708.

JOHNSON, JOHN HENRY.—(*A communication from Benjamin Hill.*)—"Improvements in ships' propellers."

The floats of a paddle wheel are hinged to the arms, and enter the water at an angle regulated by springs until the action of the water closes each float upon pinion bearings.

For rivers the paddle wheel is of less diameter on the side farther from the vessel, so as to be less subject to injury in shallow water.

[Printed, 10*d*. Drawing.]

A.D. 1858, April 20.—N° 869.

RAWSTORNE, JAMES.—(*Provisional protection only.*)—"Improved means for stopping or retarding the progress of ships or vessels."

For the purpose of retarding or stopping a vessel in motion and with a partial effect in directing it, fins or floats are to be lowered or opened towards the water by hand.

[Printed, 4*d*. No Drawings.]

A.D. 1858, April 23.—N° 899.

PIRSSON, Joseph Poole. — "Improvements in the con-" densers of steam engines."

A jet condenser and surface condenser are so arranged that one may be used even when the other is disabled, and the operation partially conducted in one may be completed in the other.

There is no atmospheric pressure on the surface condenser, and the tubes may therefore be of thin metal.

Provision is made for the alternate expansion of the metal by giving play to the tubes or the tube plate. The arrangement of tubes, pumps, and valves to effect the above purposes requires the drawings to make it intelligible.

[Printed, 1*s*. Drawings.]

A.D. 1858, April 23.—N° 900.

FOSTER, William.—"Improvements in multi-tubular and " other boilers for the prevention of smoke and economising " fuel."

By this invention air is supplied so as to cause the perfect combustion of the products in a furnace. This is effected by a blower forcing in a stream of air beneath the fire-bars, which are in ash-pits, closed in, and with regulating valves. Fire-brick bridges, one behind the other, and three or more longitudinal or transverse passages, confine the flame, so as to cause the air to act properly, and the fire-box may be lined with fire-brick along the entire length of the fire-bars.

[Printed, 10*d*. Drawing.]

A.D. 1858, April 23.—N° 903. (* *)

LUNGLEY, Charles.—"Improvements in the construction of " portable ships and boats, and their appurtenances." This invention relates to a mode of constructing ships and boats, which will admit of being taken to pieces and stowed away and of being enlarged or diminished in capacity. The ships or boats are made of plates of metal. "The screw is to be fitted so that its height

" may be adjusted at pleasure. For this purpose it may be
" mounted in a trunk or in a frame, having a regulating wedge,
" which, as it is drawn in, will adjust the screw and shaft to the
" desired level. The screw being so placed, I use two rudders,
" one on each side of the shaft. These rudders are made hollow
" to afford a free passage for water through them, and they
" are so mounted that the one rudder may be moved at any
" angle, while the other remains amidship."

" To permit of boats constructed according to my invention
" being used as land carriages, I propose to build up in them
" trunks, in which are mounted wheels capable of being raised or
" depressed by means of regulating screws, their bearings sliding
" for that purpose in vertical guides, and being provided with
" springs to ease the draft."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1858, April 28.—N° 947.

NEWTON, ALFRED VINCENT.—(*A communication.*)—"Improvements in the construction of paddle wheels."

The paddle wheels have vanes which slide outwards and inwards in grooves so as to protrude or be withdrawn into a hollow drum. Each vane is moved by a rod tied to a centre piece, which by an appropriate regulating rack can be made more or less excentric to the axis of the main shaft, and thus can regulate the dip of each vane.

[Printed, 8*d*. Drawing.]

A.D. 1858, April 29.—N° 956.

JOHANNY, ROBERT.—"Improvements in the construction of furnaces."

The furnace is closed, and has an opening through which fuel is introduced. The "fire-bar portion is formed by steps, the bars being placed at different degrees of elevation." A flue receives the gases generated in the furnace. It commences immediately above the layer of burning fuel, and extends beyond the top of the furnace.

A second flue supplies the first flue with atmospheric air. The products of combustion are received in the first flue, are there mixed with air supplied by the second flue, and consumed.

It is stated that these furnaces are available for steam boats.

[Printed, 1*s*. Drawings.]

A.D. 1858, April 30.—N° 960.

HUYGENS DE LOWENDAL, R. B.—(*Provisional protection only.*)—" Improvements in the construction of springs and for " their new application to the working of machinery."

Springs with "more than one curvature" are applied so as to ease the blow of paddle vanes and to cause them to strike the water gradually.

[Printed, 6*d*. Drawing.]

A.D. 1858, April 30.—N° 969.

CLARK, WILLIAM.—(*A communication.*) — " Improvements in " obtaining motive power, and in the apparatus connected there- " with."

Fuel is heated in a furnace, which is then closed, and water is injected and afterwards air.

The products of combustion and the steam generated are used in a cylinder and piston. Water at the bottom of the furnace among the fuel, or on specially prepared substances, will by evaporation leave any salts it contains, and these and the fuel itself may be melted by the heat.

The claims are as follows :—

" First, using as motive power the gases resulting from the " combustion and from the air which produced the same, these " gases being by said combustion increased with heated air or " with vaporized steam.

" Secondly, producing the said motive power by the combustion " of known fuels in closed fire-places without grates, also the " faculty of regulating the vaporization, the temperature, and the " combustion in its various stages, according to the nature of " the fuel employed, and of changing the proportions of the " motive mixture.

" Thirdly, vaporizing the water employed directly and without " intermediary means by its projection in a subdivided state in " the gaseous current resulting from the combustion, or in the " fuel in ignition either above or underneath the mass ignited.

" Fourthly, introducing the air into the fire-place from three " parts or regions, the quantity of air being variable into each " part: first, underneath the fuel; secondly, above for burning " the gases; and, thirdly, in the current, after the combustion, " to regulate the temperature.

"Fifthly, introducing the water injected in the blowing cylinder "during the aspiration or compression of the air, or it may be "during both states of action of the blowing engine, it has for its "object to prevent the heating of this air, to diminish the force "of the pressure of injection of the current of air going from the "blowing cylinders to the fire-places, of the currents of burnt "gas and into the fuel, and of the injection on the surfaces of "slide valves or other organs subject to be heated by the part "receiving the power, and specially to lubricate the friction "surfaces in contact with the burnt air.

"Sixthly and lastly, the whole of the means specified in the "above claims, and the Specification constituting a burnt air "motor, with mixture of vaporized water, characterized by the "instantaneous production of the motive mixture, giving to the "pistons a speed equal to that of pistons of steam engines; by "the facility of suspending instantaneously the pressure, and "annihilating the power of the fire-places; by the faculty of "setting in motion without a pressure reservoir, and by means "of a mere injection of water in the fire-place."

[Printed, 3*s*. 6*d*. Drawings.]

A.D. 1858, May 1.—N° 979.

HOPKINSON, William, and DEWHURST, John.—"Improvements in apparatus for consuming smoke."

The furnace is divided by a partition from back to front, before which is a space to admit of the passage of smoke and products of combustion. At the back are two dampers, one to each compartment of the furnace. These are each actuated by a bell crank. When one compartment is fed with the coal, the outlet at the back is closed, and the products pass at the front to the other compartment and over the fire in it, and so on alternately. In tubular boilers "the fire-box is divided into compartments by "a suitable midfeather with passages through it, and slides or "shutters are used to close the further ends of one half of the "tubes" at a time.

A drawing of a marine boiler with these improvements is given.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1858, May 8.—N° 1033.

ROBSON, JOHN THOMAS.—(*A communication.*)—" Improve-
" ments in sheet-flue and tubular boilers."

Boiler flues are arranged in a serpentine form. Between the flues are oval tubes at intervals, so that each row is in a line between two of the first before and behind it. By this means the flame is caused to impinge upon a large area of surfaces.

[Printed, 6*d.* Drawing.]

A.D. 1858, May 19.—N° 1118.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—" Im-
" provements applicable to certain descriptions of marine engines
" and in the mode of mounting paddle wheel shafts."

The paddle shaft is made so as to be elevated or depressed according to the varied draft of the vessel.

For this purpose its bearings are supported between vertical guides on nuts traversing up and down screw rods, so that by turning the nuts by steam power or hand the bearings are raised or lowered.

The cylinders are horizontal, and on different sides of the shaft, and along the vessel with long connecting rods so as to allow of the necessary variation of the axis of the shaft from the line of motion of the pistons.

The air pumps are beneath the cylinders.

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1858, May 20.—N° 1127.

BOYDELL, JAMES.—(*Provisional protection only.*)—" Improve-
" ments in machinery for propelling vessels."

Two additional cylinders are used, " open to the steam boiler" they are forward of the crank axle and fixed horizontally. The connecting rods from them are connected to crank pins on the shaft in such a manner that one piston is at the forward end of its cylinder while the other is at the back end. By this means " will there be a constant tendency of the steam to press the
" forward corners of the two additional cylinders in a forward
" direction, and consequently the ship."

[Printed, 4*d.* No Drawings.]

A.D. 1858, May 25.—Nº 1163.

WEBSTER, William.—" Improved machinery for the pro-" pulsion of vessels."

The propeller blades are in the shape of whale fins, and cast hollow. A slide piece may descend so as to enclose the blade in a water-tight chamber when it is at rest, and thus it may be approached from within. Different speeds are regulated by cog-wheels of various diameters brought into gear as may be desired. The patentee claims a new form of hull suitable for this invention, with finer entrance and run than usual, and air chambers in the dead wood.

[Printed, 8*d*. Drawing.]

A.D. 1858, May 29.—Nº 1214.

LEE, Thomas Vincent.—(*Provisional protection only.*)—" Im-" provements in the construction of steam generators applicable " to marine, locomotive, and all other uses where steam is applied " as the motive power."

The improvements are described by the inventor in the following words :—

" I construct the generator in two compartments, and through " the under portion, which alone receives the direct or sensible " action of the fire, are a series of passages leading to a chamber " or series of chambers in which a coil or series of coils con-" nected together is or are placed. The heat and gasses passing " through the passages, after acting on the under surface, heats " the coil or coils, and is fully utilized before leaving the chamber " by branch flues leading to the main flue or 'take up,' within " the base of which is a chest to which the termination of the " coil is connected ; branches from this chest are furnished with " suitable valves, cocks, &c. The steam generated in the under " compartment is passed through the coil to the upper compart-" ment, which is fitted in its interior with suitable piping, a por-" tion of which is perforated for the equal diffusion of the super-" heated steam or hydro-caloric throughout the water. Suitable " valves are placed on each compartment of the generator. " Steam for power is taken from a chest upon the upper portion, " and when required a jet of hydro-caloric is taken to the cylin-" ders of the engines from the chest within the 'take up.' The

" generator may be made of any shape; for marine purposes I " prefer globular."

[Printed, *4d.* No Drawings.]

A.D. 1858, May 31.—N° 1223.

PARSONS, William.—(*Provisional protection only.*)—" Improvements in steam engines for propelling vessels, and other " purposes, and in bearings for the screw shafts of steam " vessels."

Two horizontal cylinders have their pistons connected by a rod with a slot in it, and carrying a bar with a socket and standard. The bar fits into a socket on a disc on the main shaft. The cylinders may act on the bar " half-way between its stationary " bearing, and its bearing on the disc."

The shaft rests on a friction pulley with its axis at right angles to that of the shaft, and a screw thread on the shaft causes the pulley to revolve, and so to bring up oil from a vessel below, in which it is partially immersed.

[Printed, *4d.* No Drawings.]

A.D. 1858, June 10.—N° 1319.

CROSLAND, James Stead. — " Improvements in steam " engines."

Various plans are described for combining the working of a smaller or auxiliary oscillating cylinder with that of the main cylinder, so that they act either at right angles or at the same angles upon the crank.

Steam may be admitted and exhausted through the same trunnion of an oscillating cylinder.

An arrangement for a headwater injection, and another for multi-tubular feed water apparatus, are alluded to in the Provisional Specification, but are not particularly described.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1858, June 11.—N° 1333.

BOUSFIELD, George Tomlinson.—(*A communication from Daniel Barnum.*)—" Improvements in marine steam engines."

The water in the bilge of a vessel may be pumped out by the air pump by connecting the bilge with the air pump through a separate suction pipe, which can be opened for use as required. The several means are explained for doing this when solid pistons or bucket and valve pistons are employed.

[Printed, 8*d*. Drawing.]

A.D. 1858, June 12.—N° 1337.

GIBSON, Allan, POLLOCK, John, and MARTIN, John. —(*Provisional protection only.*)—"Improvements in the construc-" tion of steam engine boilers and furnaces for effecting the " prevention of smoke."

Air is forced into a chamber near the smoke box by an engine, and escapes by a suitable valve or by tubes running through the boiler, and connected by a perforated tube within the furnace.

Or tubes may be applied externally, serving as handrails on the top of the boiler, which are bell mouthed where they protrude at the end of the smoke box, but passing through the crown of the furnace, and with apertures for the escape of the compressed air.

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 19.—N° 1387. (* *)

WINANS, Ross, and WINANS, Thomas.—"A new and im-" proved steam vessel." The invention "consists in the combi-" nation of a hull which may be represented by the two ends of " a spindle divided transversely near the middle of its length " with a transverse vertical propeller occupying a space between " the two portions of the spindle, which are secured together by " a suitable framing or sleeve firmly attached to their adjacent " ends, and extending over the propeller." It also comprises a frame called a "sleeve," and a series of plates called "ribs," for " connecting the ends of this frame respectively with the adjacent " ends of the two compartments of the vessel, steadying the " vessel in the manner of a keel, and together with the sleeve " directing the water to and from the blades of the propeller."

The propeller consists of a water-tight drum, properly braced on the inside, the periphery of which nearly coincides with the general surface of the spindle, and carries the propelling blades, which may be of any suitable shape, and have any required inclination to the axis of the drum.

" The two parts of the hull are connected together, and the " propeller enclosed between them by the following contrivance :—

" Around their outer surface, next to the space occupied by the " propeller, ribs or standards are fastened at short intervals; " these ribs are formed of flat metallic plates, and are arranged in " planes passing through the axis of the hull. The ribs project a " little beyond the blades of the propeller, and their inner and " outer edges are flanged to facilitate fastening them by bolts or " rivets to the hull at their inner edges and to the sleeve at their " outer edges. The sleeve" "has a length equal to that of the " two sets of ribs and the space (between them) occupied by the " propeller, and includes the whole."

[Printed, 8*d*. Drawing.]

A.D. 1858, June 19.—N° 1388. (* *)

WINANS, Ross, and WINANS, Thomas.—" A new and useful " improvement in ocean steamers."

This invention relates to the improvement of ocean steamers. The improvement is to be effected by fitting the vessel with a water-tight trunk, for the accommodation of a vertical transverse propelling wheel, of larger size than could advantageously be used under any plan hitherto devised. The propeller, which consists of a water-tight drum having screw blades set upon its periphery, is arranged in this trunk in such manner that its blades will project out of the trunk, beyond the surface of the vessel at the bottom and on both sides. When the blades of the propeller project at the sides and bottom, but not beyond the line of the keel, the keel itself and the timbers or framework adjoining it may be strengthened, to give the requisite stiffness and strength to the bottom of the hull, thus compensating for the want of continuity in the sides in the part occupied by the trunk. That portion of the hull which is above the trunk may also be strengthened by a truss or other framing, in a manner similar to that in which long river boats are stiffened. In some cases the propeller might project below the straight line of the keel, and the keel be bent, or timbers or framework placed below to strengthen the hull. In certain forms of vessels, the breadth being much greater than the depth, it would be more convenient to use two transverse propelling wheels, arranged side by side in the trunk, and for the purpose of strengthening the vessel, a central partition might pass through the middle of the trunk to any distance fore and aft of it, and it might extend from the keel upwards to any required height. If the vessel should be constructed with reference to the employment of a trunk and propeller or propellers of this kind, the section of the hull below the water line in the parts adjacent to the trunk, should be made concentric with the propeller or propellers at as many points as possible, in order that the greatest area of propelling surface may be projected.

[Printed, 8d. Drawing.]

A.D. 1858, June 19.—Nº 1389.

WINANS, Ross, and WINANS, Thomas. — "A new and "useful improvement in the mode of combining the engines and "propeller shaft of steam vessels."

The circular or wheel propeller is situated near the centre of the vessel and works in a vertical space of cylindrical shape cut out of the vessel's body, and secured on both ends by bulkheads.

[Printed, 6d. Drawing.]

A.D. 1858, June 28.—Nº 1452.

LUIS, Jozé.—(*A communication.*)—"An apparatus permitting "the different parts of machinery working in the water of screw "vessels with wells to be examined and mended."

When it is desired to examine the submerged parts of the shaft of a screw propeller, a framed box is lowered by the well, and being secured so as to be water-tight round the shaft, the water is withdrawn, and the machinery can then be examined by a man descending into the box.

[Printed, 10d. Drawing.]

A.D. 1858, July 1.—Nº 1478.

KINGSLEY, Jeffries.—(*Provisional protection only.*)—"Im-"proved mechanical arrangements applicable to preventing the "sudden bursting of steam boilers."

A weight is so placed as to keep down a lid in a wide tube opening in a boiler, and when the ordinary safety valve (which is made to travel in a tube) is opened to a dangerous extent, it releases the weight and opens the larger aperture so as to blow off the steam speedily.

[Printed, 4d. No Drawings.]

A.D. 1858, July 5.—N° 1511.

NELSON, Mortimer. — "Improvements in propellers for "vessels."

At each side of a vessel a set of vertical vanes are attached to framework which is made to reciprocate fore and aft, and the vanes are allowed to feather for the return stroke. A piston entering a cylinder filled with air, constitutes a cushion or buffer to ease the stroke. Another set of vanes on each side is worked so as to alternate with the first. Various modes are explained for connecting the frames with the engine and for regulating the time and extent of the feathering motion.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1858, July 5.—N° 1512.

GREENWOOD, James.—"Improvements in marine propellers."

"This Invention relates to the construction and arrangement "of floats or float boards either disposed around a circular wheel "of the ordinary form commonly employed for propelling vessels, "or the said floats or float boards may be applied as propelling "surfaces upon arms, or as vanes radiating from a central axis or "shaft, which may be placed in any convenient position in the "vessel, either horizontally at a right angle with the keel line as "in the ordinary paddle wheel on each side of the ship, or in "the same manner applied or placed in the centre of the vessel "in a suitable well-hole prepared to receive it, or the axis or shaft "may be placed longitudinally in a line with the keel as in the "screw propeller, or transversely at a right angle with the keel "line, and at any suitable incline or angle. The said floats may "be constructed of a parallelogram shape upon the face or any "other suitable form, and may be constructed of wood or any "other suitable material, and are mounted upon a central axis "upon which or with which they revolve.

"Instead of the two sides or ends being formed square with "the back and front face, considerable bevil is given to them, so "that a horizontal section of the float or float board would pre"sent wedge-like terminations, the area of the surface of the "back face being considerably greater than that of the front face, "the bevils being deducted therefrom.

"When each float, mounted as described, enters the water, it "presents its edge only, and upon meeting with the resistance,

" the bevilled surface or edge causes the float to turn or rotate " upon its axis, and present the full surface to the action of the " water, whilst as the float is withdrawn it is caused to turn the " fourth of a circle upon its axis, and is thus feathered and pre- " sents its edge again to the line of rotation. This feathering " action is ensured by means of an inclined or curved surface or " director, against which some part or portion of the float or float " board, or the axis on which it turns, or of an arm or other pro- " jection thereupon, is made to come in contact therewith, and is " acted upon thereby."

[Printed, 4*d.* No Drawings.]

A.D. 1858, July 6.—N° 1518.

BUCHANAN, John. — " Improvements in propelling ships, " vessels, and boats."

The propeller wheel with its vanes (acting as a screw propeller) works in a hollow place cut out of the ship's body near its centre. The keel may be removed or placed low. The shaft may be parallel with the keel, or at such an angle transversely as to allow the thrust to be more exactly in the line of the keel.

[Printed, 8*d.* Drawing.]

A.D. 1858, July 9.—N° 1551.

ROWAN, John Martin.—(*A communication.*)—" Improvements " in manufacturing wrought-iron wheels, bosses, or centres, and " in the mode of and furnaces for heating the same during such " manufacture."

The invention relates to a method of " forming parts of wrought- " iron wheels and also the hubs for screw propellers." The butts of the spokes for the hubs are made of " of an angular, " curved, or zig-zag form." " The butts are made the entire " width sufficient to form a hub without the use of washers." The butts are forged with dies under a tilting hammer, and a sufficient number to form a hub are placed together, heated, and welded into a solid hub by swaging dies. The lower die is fixed to the anvil, and the upper works as a hammer. A furnace for heating the parts to be welded is described. In it " the flues " or passages for the fire and heated vapours are divided into " upper and lower flues, through either of which the heat may " be carried." It is thus capable of being directed alternately on the top and bottom of the hub. Levers attached to dampers in the flues enable the heat to be directed as required.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1858, July 15.—N° 1592.

WILLIAMS, CHARLES WYE.—" Improvements in locomotive " and other boilers for giving them increased power in generating " steam."

The object of the invention is so to deflect, mix, and disturb the general current of the hot products passing from the furnace through a tube in a boiler, that the hotter portions shall be forced to impinge upon the sides of the tubes which have cooled other portions of the gaseous stream.

This is effected by inserting obstacles to divert and disturb the stream of hot products. These may be metal projections spiral bars, fan-shaped disturbers, and other similar forms. They may be also used to clean out the tubes, and being in lengths and joints may be readily removed.

[Printed, 8*d.* Drawing.]

A.D. 1858, July 21.—N° 1645.

MATLEY, MATTHEW.—" Improvements applicable to steam " boilers for consuming smoke and economizing fuel in the " generation of steam."

Air is admitted to the furnace through perforations in a chamber, where it is heated by the furnace, and a hollow bridge is used rom which air passes through perforations made at the back.

The regulating valves which govern the admission of air are so made by using a piston in a cylinder filled with fluid, that while they allow the furnace doors to open quickly, they resume their positions again only gradually, and admit air at the time when it is chiefly wanted.

An arrangement for heating feed water is mentioned in the Provisional Specification, but is not particularly described.

[Printed, 8*d.* Drawing.]

A.D. 1858, Jnly 21.—N° 1646.

PIATTI, THOMAS.—" An improved propeller."

The propeller acts on the principle of a paddle wheel. The parts representing the floats are flat pieces of a double wedge shape, which turn through a small arc on axes through their centres by the action of one weighted end of each. Three of these arranged round a rotary drum constitute the propeller.

[Printed, 8*d*. Drawing.]

A.D. 1858, July 27.—N° 1689.

ASHTON, Henry.—(*Provisional protection only*.)—" Improve- " ments in the furnaces of steam boilers."

The doors of a furnace are in two leaves, and an inclined plate and adjustable plate regulate and direct the air admitted to the furnace. The fire-door may have a perforated plate and sliding valves for admitting air when the door is closed.

"The above improvements in furnaces are applicable to steam " boilers of marine and stationary engines."

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 27.—N° 1690. (* *)

SCOTT, John.—" Improvements in pumps, which improvements " are also applicable for the propulsion of ships, vessels, and " boats." The invention relates " to the pumping or forcing of " liquids for various purposes by the agency of a rotatory helical " coil of piping or tubes. This coil of piping or tubing is arranged " upon a globular vessel or supporting surface, having liberty to " revolve upon a horizontal axis, and by reason of the globular or " spherical form of the carrying surface of the coil of piping, the " coils at the centre of the globe are the greatest in diameter, " whilst those at the two ends are the smallest, the diminution " or taper being gradual from the centre towards each end, where " the piping is joined to stationary communicating pipes by suitable " stuffing boxes. These two ends of the coiled pipe are each " connected with a duplex branch pipe, two branches passing " downwards to a suction or lift pipe, and two upwards to the " forcing or elevating pipe. With this arrangement, as the apparatus " is caused to revolve either continuously or with a reciprocatory " action, the water or liquid to be raised or forced is drawn " up from the reservoir or source of supply, and forced or elevated " along the upper lift pipe to wherever it is required to be sent. " The coil of pipe is fitted at each end where the junctions with " the branches occur, with a pair of valves opening upwards for " the admission and discharge of the liquid." "The apparatus

" may be employed for raising or forcing various fluids or liquids, " and it may also be used as a marine propeller for propelling " vessels, by ejecting the water on the reaction principle."

[Printed, 6*d*. Drawing.]

A.D. 1858, July 31.—N° 1730.

DOUGLAS, Sir HOWARD, Bart.—(*Provisional protection only.*) —" Improvements in freeing screw propellers from wreck or gear " with which they may become entangled."

In order to free a screw propeller from ropes or wreck or other matters which may hitch round it, and be carried by the motion of the shaft into a position which would derange the machinery, a sharp steel cutter is so placed that it will sever the ropes or wreck, and free the propeller from them as an obstruction.

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 4.—N° 1770.

GILES, JOHN WHEATLEY.—(*Provisional protection only.*)—" An " improvement in propelling vessels."

A submerged propeller is to be " applied at or about the centre " of gravity of the vessel, the shaft of the propeller being at an " angle to the keel, and by preference at or about an angle of " 45° to the horizon."

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 12.—N° 1839.

PATERSON, ALEXANDER JOHN.—" An improvement in pro- " pelling ships and vessels."

The propeller blades are mounted upon a cone or frustum of a cone in a frame which corresponds to the shape of the vessel at that part, and the frame revolves round the fixed conical end of the vessel.

This revolving frame may be at the bow or stem, or at both, or there may be two such frames at one end of the vessel.

[Printed, 6*d*. Drawing.]

A.D. 1858, August 14.—N° 1858.

SMITH, JAMES, and CHEASE, SYDNEY ARTHUR. —" Im- " proved arrangements for obtaining and applying motive-power."

"This invention consists in certain mechanical appliances, so

“ arranged as to co-operate with the motive-power of the atmosphere.
“ On the plate or bed of the engine is bolted a metallic
“ ring having two plates of iron firmly bolted on the sides by
“ means of flanges. A square projection is cast on one part of
“ the ring or cylinder (this cylinder we call the sphere). On
“ the projection or table is fixed an air-pump (which we call the
“ compressor) with which the air is forced into the sphere to any
“ amount of density required for working the engine. On the
“ table is likewise fixed a flange having an elbow joint with an
“ aperture through the table into the sphere corresponding with
“ the core of the elbow joint. Near the sphere is fixed a cylinder
“ (which we call the primary cylinder) on bearings springing
“ from the bed of the engine; a piston is fitted to the primary
“ cylinder. On the plate of the piston is screwed a valve made
“ of strap leather (which we call a plate valve); in the stuffing
“ box is a continuous valve made of the same kind of leather as
“ the plate valve, and kept in its place by a ring screwed on to
“ the piston. The piston rod is bolted on to a plate having
“ two guide rods that move in sockets screwed on the cylinder.
“ The guide rods terminate in a crown above the cylinder. The
“ crown has a connecting joint that unites it to the primary lever
“ (which we call the power conductor); the power conductor
“ has jaws at one end, and a horn-shaped projection and a pair
“ of friction wheels at the other. The horn passes between guide
“ rods that spring from and are fixed on the bed of the engine
“ and immediately in front of the primary cylinder, the friction
“ wheels running on a perpendicular plane, keeping the power
“ conductor in its place. The jaws clasp and are made fast to
“ trunnions projecting from a half beam (which we call the
“ primary blade). The primary blade has at one end a pair of
“ jaws and trunnions at the other end. The trunnions are set
“ in bearings springing from the bed of the engine. A bar
“ passes through the jaws of the primary blade. On the bar
“ outside the jaws are united connecting rods; the lower ends
“ of these rods are made fast to the ears of a piston fitted in a
“ cylinder (which we call the secondary cylinder). The piston
“ has a continuous valve made of strap leather, which allows the
“ pressure of the atmosphere to exert itself against the face of
“ the piston of the secondary cylinder. Between the jaws of
“ the primary blade on the blade that passes through it is fixed
“ the crank rod (this rod we call the atomic arm). This arm

" is divided into two parts, the lower part is held by an eye, " through which the bar in the jaws of the primary blade passes. " The upper part of the arm is made in two pieces bolted " together, forming guide rods to the lower part of the arm, " which works freely through a socket. A head is bolted on to " it to hold it in its place. On the upper part of this arm a " bearing is attached, which unites it to the sweep of the shaft. " By doubling the parts herein described, the crank is made to " work at right angles. On each side of the sweep is fixed cams " (which we call secondary blades). The minor points of these " blades fall on friction wheels set on the ends of the secondary " lever (which we call the power supporter). The other end of " the power supporter is united to the power conductor by means " of union rods. As the secondary blades revolve with the " motion of the shaft, the power bearer and the power conductor " are raised, together with the pistons of the primary cylinder " and piston of the secondary cylinder (when a second cylinder " is used) are held in position until the sweep of the crank " passes three degrees beyond the angle of rest, when the major " points of the secondary blades quit the friction wheels, at the " ends of the power supporter, leaving the atmospheric pressure " to act on the piston of the secondary cylinder, when employed, " and the compressed air from the sphere to act on the piston " of the primary cylinder causing them to fall simultaneously, " forcing the atomic arm attached to the sweep of the shaft from " three degrees beyond the angle of rest to three degrees before " the centre of gravity, when again the friction wheels of the " power supporter is met by the minor points of the secondary " blades, is raised and held in position until the major points " are gained, when the power supporter, power conductor, and " pistons of the primary and secondary (when employed) cylinders " again fall, and thus a succession of risings and fallings are " maintained, until the communication between the primary " cylinder and the sphere is cut off, which is done by means of a " cock fixed on the head of the primary cylinder, and united by " means of a pipe and union joints to the elbow joint on the " boss of the sphere. The compressor has a piston. The piston " rod is united to a lever which is used by a person to compress " a sufficient quantity of air into the sphere, that when turned " on the piston of the primary cylinder a perfect balance between " it and the piston of the secondary cylinder is produced. The

" engine is then ready for use. When the secondary cylinder is
" not used a clasp is fixed to the atomic arm. Gear is led from
" the power conductor or from the shaft to the union joint of the
" compressor, causing a jet of air to be forced through the
" compressor into the sphere at each revolution of the crank,
" and all power thus injected beyond that required for working
" the engine, is carried off by means of a safety valve affixed to
" the sphere, which valve is regulated by atmospheric pressure
" on the piston of a small cylinder, which travels on a lever by
" means of a screw.

"This engine (which we call the atomic engine) is capable of
" driving all kinds of machinery which have been hitherto
" worked by steam, water, or wind, giving the propelling power
" to the paddle or screw of a marine engine, to the driving
" wheels of the locomotive on the railway, and to all kinds of
" stationary engines employed in mills and other works."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1858, August 18.—N° 1881.

SOELMAN, WILLIAM.—(*Provisional protection only.*)—" Additional improvements in the construction of propellers, chiefly
" with reference to my former Patent dated 20th August 1855."

Instead of making certain blades of the propeller " with flat
" surfaces as before, I use surfaces that are either helical, spiral,
" or otherwise curved."

The drawings show several forms of blade, but they are not particularly described.

[Printed, 6*d.* Drawing.]

A.D. 1858, August 19.—N° 1890.

SMITH, WILLIAM.—(*A communication from H. W. Gullett.*)—
" Improvements in steam engines."

A trunk cylinder is so arranged that high pressure steam, after it has acted on the annular side of the piston, is conducted through a slide valve to act with low pressure on the other side, by admitting it to expand, after which, and during the change of direction of the piston's motion, the annular part is in communication with the condenser, so that in that part there is a partial vacuum.

Two cylinders thus arranged at angles to each other, are connected to the same crank shaft.

[Printed, 10*d.* Drawing.]

A.D. 1858, August 28.—N° 1954.

BRABAZON, James Dupré.—" Improvements in giving motion " by sails to screw and other propellers of ships and vessels."

A shaft carries arms, on each of which is a lug or other sail, and the action of the wind causes the shaft to revolve and to work a screw propeller.

[Printed, 6*d*. Drawing.]

A.D. 1858, August 30.—N° 1969.

JOHNSON, John Henry.—(*A communication from William W. W. Wood and John Rice.*)—" Improvements in the construction of governors or regulators for steam engines."

Two weighted balls are caused to revolve by the engine, and their motion along the radii of the circle is caused to press on a spring furnished with a toggle joint connection, in such a manner that the effect of the spring is nearly constant, while the motion of the balls causes a pulley to revolve, and regulates the action of the throttle valve.

[Printed, 8*d*. Drawing.]

A.D. 1858, September 9.—N° 2042.

TAYLOR, William, and BAUGH, Peter Absalom.—(*Provisional protection only.*)—" An improved apparatus for propelling " ships or other navigable vessels through water."

The propeller consists of an " angular framework " suspended on a shaft, and worked fore and aft, so that float boards hinged to it act upon the water and close or open as the frame is moved forwards and backwards.

[Printed, 6*d*. Drawing.]

A.D. 1858, September 30.—N° 2173.

BRITT, Thomas. —" An improvement in the propelling of " steamboats."

The " invention consists in the construction of a folding four- " blade propeller, and the shafting for the same ; this propeller " is formed by four blades being coupled together by a joint in " the boss of the propeller ; the two principal blades that have " the bearings ; the centre part of the boss is taken out half way " along the boss, sufficient metal in the thick part of the blades " to answer for the centre of the boss being taken out ; the other

" two blades, the boss is taken out half way along; it goes in " the boss of the two principal blades, and the after bearing is " bolted on the two principal blades. The two principal blades; " the fore part of the boss is hollow, the shaft goes through that " part to work the two centre blades; thus the joint is formed " in the boss of the propeller. The object of this joint in the " boss of the propeller is that it allows the propeller to close " together or open out at right angles, as may be required; these " blades close together for the convenience of lowering the " propeller down in its place, or hoisting it upon deck when the " propeller is down in its place. There are apparatus to open " them out at right angles, and the shaft is made to couple " them in that position, and work them in that position."

[Printed, *6d.* Drawing.]

A.D. 1858, September 30.—N° 2174.

WRIGHT, JOSEPH.—" Improvements in the mode of arranging " and moving fire-bars for locomotive, puddling, and other " furnaces."

Fire-bars are arranged "in such a way that by acting on the " alternate ends of a set or series of such bars they shall be " raised or lowered in contrary directions." This is effected " by means of a chain or chains passing over suitable pulleys, " and counterpoised with a suitable resistance or weight," "or " by using a curve-ended lever or some such mechanical " equivalent." Or the fire-bars, especially in marine boiler furnaces, may be arranged so as to have "an horizontal reciprocating motion," by being mounted on rockers, one of which rockers is provided with a lever. By these means the cinder is displaced and broken up.

A rake worked by a winch handle or otherwise, may be caused to advance over the upper surface of the coal to break it up still further.

[Printed, *1s. 4d.* Drawings.]

A.D. 1858, September 30.—N° 2181. (* *)

NORMAND, AUGUSTIN.—This invention has for its object to provide a means of closing the well hole of screw steam vessels whether the screw be working or not, and at whatever depth the well hole may be situated below the water line, in such manner that the surface of that part of the stern of the vessel may be

unbroken. "To carry out this improvement, first, I give to the
" part of the stern comprised between the two stern posts on each
" side of the central plan of the vessel, and on a proper extent, a
" segmental form, either convex or concave, in cross section, or a
" plane surface, whichever will best suit the shape of the stern of
" the ship. Secondly, I close the bottom opening of the well hole
" by sliding lateral doors or shutters (of wood, or metal, or both),
" taking the form of the outside of the vessel, and moveable either
" from within or from the deck of the vessel, so as to recede or
" approach each other. If thought desirable, the sliding doors
" may be divided into several parts, and either worked together
" or separately. They may be opened or closed by means of
" endless chains, racks and pinions, screws, or any other means
" found most suitable, according to the size, form, and arrange-
" ment of the vessel to which they are fitted. I also propose to
" alter the usual shape of the opening of the well hole, making it
" follow the profile figure of the screw when viewed from above,
" the screw being turned to bring the central part of its blades into
" a vertical line, which is the position it will be required to take
" when it is raised or lowered. This novel arrangement has the
" advantage of reducing, as far as is practicable, the internal size
" of the well hole, and consequently the surface which the sliding
" doors have to cover, and to give a greater length to the guides
" for the shutters."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1858, October 2.—N° 2199.

NEWTON, ALFRED VINCENT. — (*A communication.*) — (*Provisional protection only.*)—" An improved governor for marine
" and other steam engines."

The steam from the boiler passes through a tube forming part of the valve box of a small regulating engine, and acts on one of the valves, which is double-headed, so as to keep them open to a desired degree.

The main engine gives motion to a pulley shaft and disc, and the regulating engine gives motion to a disc on a hollow shaft surrounding the other and meeting with a uniform resistance. The double-headed valve of the latter engine (regulating the opening for the admission of steam to the other) will be more or less open according to the relative speeds of the two shafts.

[Printed, 4*d.* No Drawings.]

A.D. 1858, October 9.—N° 2253.

PASCOE, James Bray, and THOMAS, John Robert.—(*Provisional protection only.*)—"Improvements in condensing and "gassing smoke, which are applicable also to forcing and draw- "ing water, propelling ships, and drawing and forcing air, to be "worked with animal, water, steam, or air power."

"In propelling ships we take the water from the bows of the "vessel, pass it through the machine, and discharge it through "the stem in as large a column as may be required for any pur- "pose, which column will act as a fulcrum by which we can gain "speed."

[Printed, 8*d*. Drawing.]

A.D. 1858, October 12.—N° 2274.

BEADON, George.—"Improvements in the construction of "ships, boats, rafts, and vessels for passing through water or "through the atmosphere, or partly through the water and partly "through the atmosphere."

Among the parts of this invention relating to propulsion is the use of a loom or tail propeller by which the water is to be passed astern more readily than by the usual construction. The propellers used are threads of a screw upon a conical boss, and sometimes a conical cover is placed outside.

Other parts of the invention relate to the construction of the vessel's hull in tubular pieces, and to the mast and sails for such vessels.

[Printed, 10*d*. Drawing.]

A.D. 1858, October 14.—N° 2290.

SMITH, James Randal.—(*Provisional protection only.*)— "Improvements in apparatus for propelling boats and vessels."

"A horizontal transverse paddle shaft is fitted up in suitable "bearings near the boat's bow or well forward; this shaft has a "paddle wheel at each end working in the usual manner, and it "has upon it a toothed pinion, by which it is geared through a "train of spur wheels and pinions, with the shaft of a ratchet "wheel, which shaft works in bearings a little abaft the paddle "shaft. The train of gearing is so arranged that one turn of "the ratchet shaft gives a considerable number of turns to the "paddle wheel shaft. The ratchet wheel is actuated by a pawl

" and detent arrangement, in connection with one end of a long " working lever disposed lengthways and horizontally in the " boat, the length being as great as the boat will conveniently " allow. The party working or propelling the boat, is seated in " the stern, so as to be within convenient reach of the after end " of the great lever, and by working this lever up and down in " a vertical direction, he actuates the ratchet movement, and " through it and the gearing the paddle wheels. The long " actuating lever gives the operator great power, and a com-" paratively small amount of traverse of the hand-worked end, " gives a considerable amount of movement to the paddle wheels. " Instead of one main lever two or more such levers may be used " for corresponding operators; and instead of the ordinary ratchet " action, a silent clipping or frictional nipping ratchet movement " may be employed. Various kinds of gearing may also be used " for getting up the speed."

[Printed, 4*d*. No Drawings.]

A.D. 1858, October 16.—N° 2314.

JENSEN, PETER.—(*Provisional protection only.*)—" An improved " apparatus for governing or regulating the speed of marine " engines."

The throttle valve of marine engines is acted upon by a piston in a cylinder open at one end to the pressure of the water outside, while there is resistance to the motion of the piston towards the other closed end.

[Printed, 4*d*. No Drawings.]

A.D. 1858, October 19.—N° 2337.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from J. C. Meunier.*)—" Improvements in propelling vessels."

Vanes or float-boards upon vertical rods at the side of a vessel are caused to act on the water, always with their surfaces vertical, and to be lifted out of the water for the return stroke.

This is effected by cranks and rods working on proper pins in a manner clearly explained in the drawings.

The float-boards may have the dip regulated according to the vessel's draught of water by an apparatus worked from the deck.

[Printed, 6*d*. Drawing.]

A.D. 1858, October 25.—Nº 2378.

ROBB, John.—"Improvements in propellers for ships and "boats."

Floats or boards are attached to a frame moved backwards and forwards horizontally in the water, so that they act in one direction to propel the vessel, while they fold down and are feathered when moving in the other direction.

[Printed, 10d. Drawing.]

A.D. 1858, October 27.—Nº 2390.

BLEAKLEY, James.—(*Provisional protection only.*)—"Improvements in boilers, flues, and the methods of fixing the "same."

Tubes are arranged one within another telescopically supported, and with intervals to allow the heated air to pass between and around them to generate steam.

Arches or tiles are placed in the combustion chambers to consume the smoke by igniting it and cause it to pass in a flame through the flues.

[Printed, 4d. No Drawings.]

A.D. 1858, October 29.—Nº 2418.

WRIGHT, James.—(*A communication.*)—"An improved application of machinery to be used as a new motive propelling "power."

Pistons act in cylinders open at one end to water or air and thus propel a vessel on water or a carriage on land. The pistons are worked by steam.

[Printed, 6d. Drawing.]

A.D. 1858, October 29.—Nº 2421.

BROOMAN, Richard Archibald.—(*A communication from Joseph Vanossi.*)—(*Provisional protection only.*)—"Improvements "in obtaining motive power."

The following is the description given by the inventor: —"This invention is stated to consist in obtaining motive "power to propel vessels in the water, and engines and carriages "on land, by the employment of steam to act upon water or "other liquid contained in a vessel divided into two compart- "ments, and fitted with curved pipes or vanes, through which

" the liquid is alternately driven from one compartment into the " other, in such manner as to obtain a reactive effect at or near " the mouths of the curved pipes. Valves are used for regulating " the admission and exit of the fluids, worked by floats rising and " falling with the liquid."

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 9.—N° 2502.

ALLEN, EDWARD ELLIS.—" Improved machinery or apparatuses " for working the propellers of vessels."

The steam from the boiler enters a cylinder and expands thence into another surrounding the first. The piston rod of the central cylinder is connected by a cross head in a " a guide trunk." The piston rods may terminate at the cross head, and two separate rods pass to the "guide trunk."

Another arrangement is made when the cylinders are side by side. "The principal" is "that of transmitting the force of " double cylinder engines to the crank shaft by passing rods" " to a guide trunk."

In another the inner cylinder is in part a trunk, but it has its own piston besides and a piston rod and connecting rod.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1858, November 10.—N° 2519.

BUCHANAN, JOHN.—(*Letters Patent void for want of Final Specification.*)—" Improvements in propelling vessels, ships, and " boats."

A flat board is hung to a shaft nearly vertical and reaching into the water, and when one end of the board is lifted by a chain, it assumes such a position that a reciprocating movement of the shaft produces an action like that of a feathering oar. The shaft is worked by an engine.

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 10.—N° 2522.

HUMPHRYS, EDWARD.—" Improvements in steam engines " and boilers."

A large and a small cylinder are used with the same piston rod. The steam works first at high pressure in the small cylinder and then expansively in the other. A steam jacket outside the cylinder is of wrought iron and supported by ribs on the cylinder.

In locomotive engines a pair of engines works each wheel independently. The steam cylinders are within the smoke box or boiler, and the moving parts of the engine are in a cistern holding lubricating materials.

The tube case of locomotive boilers is rectangular in shape, and strengthened by stays like those in a fire-box, which serve also to make flues.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1858, November 10.—N° 2524.

BROOKS, Abraham James. — " An improvement in screw " propellers."

The invention relates to the blades of screw propellers, and " consists in employing vanes in the form of segments of " cylinders concentric with the axis of the propeller and included " between the propelling face of the blade and a plane passing " through the aftermost edge of the blade at right angles to the " axis."

[Printed, 6*d.* Drawing.]

A.D. 1858, November 11.—N° 2531.

MABERLEY, Frederick Herbert.—" Improvements in the " construction of ships of war, and other vessels, their machinery " and appurtenances."

The vessel may be propelled by vanes on rods actuated by cranks so as to dip into the water and rise out of it nearly vertically after their stroke. The use of a windmill is referred to.

Other parts of the invention relate to the form of the hull and iron plating, " lazytongs " for sounding centrifugal pumps, guns with moving breeches and needle triggers; also a rod underneath the hull, which on touching an obstacle will act on the stopping and reversing gear of bevil wheels to work the engine.

[Printed, 1*s.* Drawing.]

A.D. 1858, November 11.—N° 2537.

BUCHANAN, John.—(*Letters Patent void for want of Final Specification.*)—" Improvements in propelling vessels, ships, and " boats."

Feathering paddles. Each float turns on its arm as an axis, and this passes through it so that the surface is unequally divided. The feathering motion is secured by the use of a stud and fixed guides, and provision is made for a proper position of the float when the paddle is turned astern.

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 17.—N° 2596.

DOUGLAS, Sir HOWARD, Bart.—(*Provisional protection only.*) —" Improvements in screw propellers."

The blades of screw propellers are so curved that the outer part of the leading edge is behind or in rear of the inner part (considering the angular motion), and this edge may be sharpened or serrated so as to cut ropes or other obstacles.

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 19.—N° 2625.

MARSHALL, WILLIAM.—" Improvements in steam engines."

The invention consists chiefly in arranging conveniently the two cylinders of a double cylinder engine on the expansive principle and the air pumps. The mode of doing this can only be explained in connection with the drawings attached to the Specification. The air pump of marine engines of this description is in a line with the high pressure cylinder, so that the pump rod and piston rod are directly connected. By arrangements described with the drawings the whole of the functions of the high pressure and low pressure valves are performed by the actions of two link motions, and the levers connecting the high and the low pressure cylinders are so adjusted as to give the former a stroke of one half the length of that of the latter.

In another plan the bucket of the air pump cylinder and the piston of the high pressure cylinder are on the trunk principle.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1858, November 22.—N° 2651.

NEWTON, ALFRED VINCENT.—(*A communication from Samuel Huse and Samuel Huse, junior.*)—" Improved apparatus for propelling and steering vessels."

The propeller screw is in the body of the rudder, and is turned to one side or the other with the rudder. Motion is given to the propeller by bevil gear from the main shaft by means of a bevil wheel on that shaft, another on a vertical post, and a third on the shaft of the propeller.

The thrust of the propeller is received upon a sleeve or case, enclosing part of the vertical post.

A means is also described for the use of an india-rubber spring which eases the shock between the rudder and the tiller.

[Printed, 10*d.* Drawings.]

A.D. 1858, November 26.—N° 2686.

BOWIE, Andrew.—(*Provisional protection only.*)—" Improve-
" ments in governors for marine engines."

The steam is admitted to the engines by a valve which is more or less opened according to the pitching of the vessel, by the action of a weighted lever which swings with the motion of the vessel.

[Printed, 4*d.* No Drawings.]

A.D. 1858, December 1.—N° 2742.

SAMUEL, James, and NICHOLSON, John.—" Improvements
" in and in connexion with marine and other steam engines."

A surface condenser of tubes arranged at the side of the paddle wheels is described.

A supplementary engine for pumping feed water into the boiler is used and a supplementary boiler for generating steam from salt water to feed the waste in the boiler. Air pumps are to be dispensed with.

[Printed, 8*d.* Drawing.]

A.D. 1858, December 8.—N° 2812.

MANNING, Robert Lang Paige.—(*Provisional protection only.*)—" A floating paddle wheel."

The inventor thus describes his invention :—

" I construct and fix two or more cylinders or drums to the
" sides of sailing vessels, making them of any suitable metal or
" material, and also water-tight and air-tight, by which I increase
" the buoyancy of the vessel, and consequently its speed in sailing.

" For steam vessels, I give the said cylinders or drums a rotary
" motion from the crank shaft of the engine, or by other suit-
" able means, and by attaching paddle boards to the surfaces of
" the said cylinders or drums, either transversely or diagonally,
" but the latter in preference, I obtain a very effectual and power-

" ful means of propulsion. In case water should obtain access " to the interior of the cylinders or drums by leakage or other-" wise, I extract it by a syphon or other suitable apparatus."

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 9.—N° 2825.

ELDER, JOHN.—" Improvements in paddle wheels."

The floats of paddle wheels are made of metal, the thickness of which is regulated according to the amount of strain at various parts, and the edges are bevilled off. A float of a slightly concave shape is represented as employed.

[Printed, 6*d*. Drawing.]

A.D. 1858, December 10.—N° 2838. (* *)

BEARDMORE, WILLIAM.—" Improvements in steam boilers."

By this invention the steam is superheated before or as it leaves the boiler by the products passing to the funnel or chimney. The fire-place is formed at the lower part of the boiler, and has the water all round it, except at the front, where the feeding door is placed; the products of combustion having passed towards the back of the boiler rise into a chamber, from which a number of tubular flues proceed into the uptake flue, leading to the funnel through which part of the products of combustion pass, and as the flues are covered with water steam is generated. Part of the heat and gases are used to heat the water, and part to heat the steam within the steam chest. The uptake flue passes through the steam chest, and the interior of the tubes contain steam while they are externally heated, the products of combustion passing into the uptake flue into the chimney; thus the whole of the steam, in addition to being heated by the sides of the uptake flue, is heated by passing through the heated tubes that pass across or through the uptake flue to the steam box from which the engine takes its supply.

A marine steam boiler is described with this apparatus attached to it.

[Printed, 10*d*. Drawing.]

A.D. 1858, December 15.—N° 2868.

ROWAN, DAVID.—" Improvements in steam engines."

High and low pressure action are combined by causing the first to operate on a piston in a cylinder, and the other on an annular piston round this cylinder enclosed by another cylinder. The slide valve may have ports so arranged as to work the steam for both pistons.

These arrangements are called the "inverted duplex cylinders," and "oscillatory duplex cylinders."

[Printed, 10*d.* Drawing.]

A.D. 1858, December 15.—N° 2874.

VASSEROT, Charles Frédéric. — (*A communication from Mr. Billotet.*)—" An improved pendulum governor for regulating " the supply of steam to the cylinders of marine engines."

A pendulum is so arranged as to vibrate " only in a plane " parallel to the axis of the ship," and the vibrations are caused to act on the throttle valve, so that when the stem is lifted from the water the steam is cut off. This is effected by a " muff," and various arms and spindles which require to be explained with the drawing.

[Printed, 10*d.* Drawing.]

A.D. 1858, December 17.—N° 2892.

ASTON, James Jones.—" Improvements in machinery or pro- " pellers applicable for the propulsion of ships, boats, and other " vessels on and through the water, and in the propelling of all " such vessels on and through the water by means of such " propellers."

Instead of paddle wheels with floats, discs are employed, either of metal or wood, and the surface of the discs is smooth, while they are made as thin as is consistent with strength. The discs are fixed on a rotating axis, as the paddle wheels are upon a paddle shaft, and either one or more may be placed on the axis projecting beyond each side of the vessel, or at any other part of it. The discs are caused to dip more or less in the water, and may be encased. When two or more are used on the same end of the axis, they are to be close together.

[Printed, 10*d.* Drawing.]

A.D. 1858, December 22.—N° 2922.

SHARP, George, and ELDER, William.—(*Provisional protection only.*)—" Improvements in furnaces and steam boilers."

Fuel is supplied by means of a screw outside a hollow cylinder through which air passes to the furnace. The air enters through a funnel, and the fuel through a hopper. " Feathers or arms " on the exterior of the cylinder serve to spread the coal and force the air into the interior of the furnace. A fan is employed when required.

[Printed, 4d. No Drawings.]

A.D. 1858, December 30.—N° 2995.

BATESON, SAMUEL STEPHEN.—" Improvements in generating " steam."

Steam is highly heated by passing (from one or more auxiliary boilers if desired) through a series of tubes placed in the furnace, and then entering the steam boiler at a high temperature.

[Printed, 4d. No Drawings.]

1859.

A.D. 1859, January 1.—N° 23.

MORGAN, JOSEPH BOND. — " Improvements in propelling " navigable vessels."

This " invention consists in giving motion to navigable vessels, " by means of a submerged vertical flat or nearly flat blade or " vane, by preference of a square or nearly square form, which is " mounted vertically between the two outer ends of two hori- " zontal arms, in such a way that it is at liberty to turn freely on " its axis from about 45° to 80°. The horizontal arms carrying " the swiveling blade have an horizontal, semicircular, or partial " semicircular motion communicated to them through a vertical " driving shaft, to which one or both of the arms are staked." " The propelling blade with its supporting arms are placed in an " opening formed in the dead wood of the run of the vessel, or " in framework placed beyond the stern or projecting forward " from the bow, or placed below the keel, or a duplicate set may " be mounted in suitable framework on each side of the vessel. " When an horizontal, semicircular, or partial semicircular, or " swinging motion across the line of the vessel's track is given to " the horizontal arms which carry the swiveling blade, the vessel " will be drawn in the direction of the centre of the arc formed

" thereby, by the action of the back of the blade against the
" water, the blade turning on its own vertical axis at each
" oscillatory motion of its supporting arms, so as always to
" present the back of the blade to the resistance of the water, at
" an angle of about 45° to a line radiating from the axis of the
" horizontal arms."

When this invention is applied to a vessel as an auxiliary power, " it is prefered to form the propelling blade in two parts
" jointed together through its vertical axis, so that when it is not
" in use, on the horizontal arms upon which it is mounted being
" placed so as to point forward, the flaps or vanes will fall fore
" and aft, or nearly so, thereby preventing their impeding the
" vessel's way when under sail."

[Printed, 6d. Drawing.]

A.D. 1859, January 8.—N° 66. (* *).

DELANY, WILLIAM. -(*A communication from Lodner D. Phillips.*) (*Provisional protection only.*)—This invention has for its object improvements in submarine boats or vessels, and in apparatus for working under water. The submarine boat or vessel is elliptical, or rather egg-shaped in transverse section, and runs off to a point at both ends; and at the top, bottom, and sides, four or other number of keels are fixed to keep it steady in the water. Through one end of the vessel a hollow shaft passes, by a ball-and socket joint, and on this shaft a rudder is mounted; beyond the rudder there is a screw propeller, which is driven from the interior by an axle passing through the hollow shaft of the rudder. In conjunction with this boat or vessel, a diving armour is employed, so that when the boat or vessel arrives at a point where work is to be done, a diver may leave the same to do whatever may be required. This armour is formed of metal, the moveable parts being so fitted and joined together that the pressure of the water may be sustained by the armour, and not communicated to the body of the diver.

In order to facilitate the movement of the diver, a screw propeller is attached to the front of the armour. The submarine boat is [illegible] to be in some cases fitted with steam engines, to propel it more rapidly when it is at the surface of the water; the same power also serves to pump air into the tank.

[Printed, [illegible] No Drawings.]

A.D. 1859, January 8.—N° 70. (* *)

NEWTON, William Edward.—(*A communication from Louis Arnier.*)—Improvements in marine and stationary steam engines and steam generators.

The main shaft of the engine is cranked in several places throughout its length, corresponding to the connecting rods of the cylinders. The cranks are arranged so that the first is at the top of its course, while the two others occupy intermediate positions, dividing the revolutions of the shafts into three equal parts. "The steam from the induction pipe is admitted into the steam " cylinders under the pistons. The space above the piston is " open to the atmosphere, the pressure of which is added to the " effect of the cranks on the main shaft, to facilitate the descent " of the piston. When the piston has arrived at the top of " its course, the steam will escape through the slide valve into " the condenser. The escape of the steam and descent of the " piston are facilitated by a vacuum formed at the same time in " the condenser by the air pump. On entering the condenser " the steam, cooled by a jet of cold water, escapes into the " atmosphere."

The eduction and induction valves are worked by connecting rods and eccentrics. The rod of the latter carries a helical spring, which, when compressed by the eccentric, is freed, and, pushing back the rod, closes the valve. The motion of the slide valve is produced by a cam and spring, and motion is conveyed to the main shaft from another shaft by a fly wheel.

"To utilize the waste heat of the spent steam, and raise the " temperature of the feed water, small pipes extend throughout " the whole length of a long pipe of large diameter, and terminate " at each of its ends in a single pipe, whence the water is supplied " by the feed pump to the boiler, where it passes by means of " vertical side pipes to a series of small tubes set inside the lower " part of the boiler, and which are exposed to the full action of " the furnace underneath the boiler." "The flames and gases, " after having heated the lower set of tubes, pass to another set " of tubes above, and thence escape through the smoke box and " chimney into the atmosphere."

[Printed, 1*s*. Drawings.]

A.D. 1859, January 11.—N° 89.

BURGH, Nicholas Procter.—"Improvements in steam " engines."

The form of this engine may be described by supposing a circular portion of the piston to be depressed, and the piston rod with a cross head united to other piston rods on the annular part of the pistons.

The similar circular pistons in the upper cylinder being then depressed inwards to form a fixed trunk, and the lower cylinder end having a like corresponding depression (which projects outside), the steam will act on an area of pistons without the deductions made in ordinary trunk engines for the portion compressed in the trunk.

[Printed, 1*s*. Drawing.]

A.D. 1859, January 12.—N° 92. (* *)

OLIVER, WILLIAM. — "Improvements in the construction of " boats of the ordinary description, such as pleasure boats, ships' " boats, or otherwise, with the view of enabling them to be pro- " pelled by the feet of the operator." The improvements consist " in employing for the said purpose paddle wheels placed on " either side of the boat, and connected through the medium of " a crank shaft, to which motion is communicated through the " intervention of treadles, the said wheels being moved in either " direction, and one or both of the same actuated at pleasure by " the employment of a slide-rod motion and disconnecting gear, " whilst, for the convenience of steering, the yoke lines are " brought round and secured in the front of the operator, who " sits with his face towards the bows."

[Printed, 6*d*. Drawing.]

A.D. 1859, January 17.—N° 137.

MONTGOMERY, JAMES.—" Improvements in the construction " of the hulls of steam and other vessels, and in the feed water " heaters, boilers, water gauges, condensers, engines, and pro- " pelling machinery appertaining to the former; a portion of " which improvements (with the exception of those on the hull) " are applicable to analogous useful purposes."

Various forms of the hull to receive the screw propeller working obliquely.

A plan for heating the feed water by the exhaust steam. The feed water reservoir surrounds the smoke-stack. The cold water falls on " a perforated floor, which divides it into a fine shower."

The exhaust steam is injected below the floor to heat the water. When the boiler is to be replenished, the supply of steam and water is cut off from the reservoir.

Internal flues and condensers are made of corrugated metal. The water or steam way may be made moveable. The boiler has the furnace in its upper part.

To prevent foaming, and to gauge the water in the boiler, a float on a pivot is used. The joint where the pivot leaves the boiler is made water-tight by the pivots working through an india-rubber sleeve. An index outside determines the height of the water.

Bent tubes are arranged for a superheating apparatus about the furnace.

There is an auxiliary high-pressure boiler for heating a jacket round the main boiler.

A thermal apparatus of expanding metal rods regulates the heat of the superheating apparatus, the supply and the temperature of the water in the boiler and condenser, and the action of the donkey engine for an artificial draft.

Cylinders are made in segments bolted together, and hollow segmental shafts and rods with a flanged bore.

The propeller is made adjustable vertically and in azimuths by joints and a turn-table. It is fitted in a cylinder, The engine may be moved with it, and have a steam pipe with ball-and-socket joint, or the connecting of the shaft may have a telescopic joint.

A propeller shaft is made hollow and buoyant by the water being ejected by centrifugal action. It may also be used as a pump.

Apparatus is described for elevating the propeller by levers on a sliding frame, or by endless chains. A cap is provided to fill the place of the propeller when it is moved.

There are thirteen sheets of Drawings.

[Printed, 6*s*. 6*d*. Drawings.]

A.D. 1859, January 21.—N° 190.

O'HARA, CHARLES.—" Improvements in propellers for pro-" pelling steamboats, ships, and vessels."

The propeller consists of a portion of a cylinder vibrating on a vertical axis. The circular part turns in a recess, and the flat vertical faces act alternately against the water. To give stern way the positions of the flat and circular parts are reversed.

[Printed, 10*d*. . Drawing.]

A.D. 1859, January 26.—N° 235.

ALEXANDER, WILLIAM RICHMOND. — "Improvements in "furnaces and apparatus for the manufacture of sugar, and for "the consumption or prevention of smoke."

The principal parts of the improvements relate to furnaces for the manufacture of sugar, but there are some applicable to the furnaces of steam boilers generally, and one modification specially relating to marine furnaces. In this last arrangement, air is heated in an apparatus composed of concentric cylinders, placed in the funnel. Thence it is conducted to the back of the furnace, and allowed to enter between the fire-bars and through a fire-bridge. The products of combustion are led from the back of the furnace through tubes to the front, and thence discharged into the funnel, where they pass through and around the heating apparatus above described.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1859, January 28.—N° 256.

ROBERTSON, WILLIAM.—"A new apparatus for propelling "boats on canals, rivers, and lakes of moderate depth."

An endless chain works over drums on a vessel propelled by the action of the links or projections on the chains working on the bottom of the river or canal.

[Printed, 10*d.* Drawing.]

A.D. 1859, February 4.—N° 323.

MABERLEY, FREDERICK HERBERT. — "Improvements in "obtaining spring power, and in its application to various "purposes."

Box springs with fusees are operated on by levers and ratchets, "the ratchet apparatus affixed by squares to the spindles of the "fusees so as to be moveable at pleasure, and the ratchets worked "by the levers operated upon by racks and pinions. The racks "supported or balanced by weights, and those racks worked "up and down by double cogged, or otherwise, pinions, the "racks carrying the levers up and down," and the pinions "revolved by ratchets and levers," operated by hand or otherwise. All the springs may be on one spindle, and all the fusees on another, or each may have a separate spindle. "The spring " power may be aided by weight power," The inventor attaches " wheels to fusees, and these carrying straps work the paddle " wheel." Amongst other purposes, the apparatus may be used to drive ships, barges, and boats.

[Printed, 4d. No Drawings.]

A.D. 1859, February 4.—N° 328. (* *)

HONEYMAN, JOHN.—" Improvements in the construction of " ships, vessels, and boats, and in propellers for propelling the " same." This invention relates to a peculiar system or mode of constructing the hulls of such ships, vessels, and boats as are especially adapted for the improved screw propeller, which may also be applied to any form of ships, vessels, or boats. " According to these improvements the lower part of the hull " of a ship or other vessel, that is to say, the portion that " is below the water line, is not contracted and narrowed into " a wedge-like form, but is built of a cylindrical figure, the " width of which corresponds to the width of beam at the " upper part of the hull. This enlarged portion of the hull " extends from the bow of the vessel backwards nearly to the " stern, where it is hollowed in so as to form a concavity or " recess at the parts adjacent to the stern post. The enlarged " part of the hull is made of uniform width from the stem backwards, until it curves away inwards to the stern post; or in " lieu of making the sides straight and parallel to each other, " they may be made gradually narrower as they approach the " inwardly curved part at the stern. The cylindrical portion of " the hull projects well out at the stern, where it is enclosed by " metal plates or timber, so as to form a flat vertical surface. At " this part a screw propeller is fitted, the driving shaft of which " is carried through the end disc of the cylindrical part; the " screw propeller consists of a conically-shaped drum having " vanes or blades extending backwards in a curved direction " from the apex of the cone to the base. The disc which forms " the base of the cone is made to correspond in diameter to that " which encloses the cylindrical part of the hull, the apex of the " cone forming the outward termination of the lower part of the " hull. The driving shaft passes through the central line of the " cone to which it is keyed or otherwise secured, and is carried

" thence inside the hull, and connected to the engine or other " prime mover. When this propeller is put in motion its conical " figure causes it to pass through the water with great facility, " the water that is moved aside by its action glides smoothly and " without obstruction along the sides of the hull until it arrives " at the concave part near the stern, where it closes in, and by " its reaction on the hollow portion of the hull assists the " onward progress of the vessel, by which an increase of speed " is obtained."

[Printed, 10*d*. Drawing.]

A.D. 1859, February 7.—N° 341. (* *)

CRISPIN, William Henry.—(*Provisional protection only.*)— " An improved atmospheric and hydraulic engine for sailing and " steam vessels." The invention relates to certain improved methods of obtaining power, and of applying the same to various purposes for which it may be required in sailing or steam vessels. The power is to be obtained " by the oscillation of a pendulum, " the vibration whereof is caused by the motion of the ship; " suitable arrangements of wheelwork or other necessary con- " trivances and combinations of machinery being actuated by the " pendulum when in oscillation."

[Printed, 4*d*. No Drawings.]

A.D. 1859, February 14.—N° 409.

HUNT, Thomas.—" Improvements in steam boilers or gene- " rators, and in the prevention or combustion of smoke."

Transverse partitions are placed in the furnace fire-box or flues, with holes arranged in each so as not to be opposite and so as to lengthen the course of the heated gases and to facilitate the absorption of heat by the water in the transverse water ways.

Tubes may be combined with the partitions, being fixed near the smoke box at the end of the boiler, and tubes passing through the shell of the boiler may be used to admit air by boxes with valves or regulators.

An oval-shaped fire-door opens in the centre only, and the parts above and below the doorway are perforated to admit jets of air to the furnace.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1859, February 17.—N° 449.

JOHNSON, John Henry.—(*A communication from John Eaton.*) —" Improvements in apparatus for propelling and steering vessels " and other floating craft."

Water enters a scroll-shaped box and is ejected by rotary motion so as to propel a vessel in a direction dependent on the position of the aperture of ejection.

[Printed, 6*d.* Drawing.]

A.D. 1859, February 22.—N° 480.

SOELMAN, William. — (*Provisional protection only.*) — " Im- " provements in the construction of propellers."

The propeller vane broadens suddenly, and then becomes narrow again in a shape which can only be explained by the Drawing. No description is given.

[Printed, 6*d.* Drawing.]

A.D. 1859, February 24.—N° 502.

HOLMES, James.—(*Provisional protection only.*)—" Improve- " ments in machinery or apparatus for propelling vessels, ships, " and boats."

" A pair of parallel horizontal steam cylinders are fitted up in " the stern of the vessel beneath the level of the water-line, one " on each side of and parallel with the keel. Each piston rod is " connected in any convenient way with a horizontal propelling " rod, the axes of the two rods being in one and the same line. " The propelling rod works out astern through a stuffing box in " the ship, and its outer end is connected directly to a vertical " transverse standard piece, formed with slide pieces at the top " and bottom to fit in between the upper and lower parallel " longitudinal guide bars. The propelling rod is passed through " the centre of this standard or central bar, and it has upon " its extreme end, two transverse stop bars set across or at " right angles to each other, and keyed firmly on. The central " bar or standard has hinged to it on each side a propelling " float board or flap of metal or wood, each float having a " top and bottom vertical hinge like a gate. Provision is made " for turning the propelling shaft as required, so as to set either " of the transverse stop bars horizontal at pleasure."

[Printed, 4*d.* No Drawings.]

A.D. 1859, February 25.—N° 515.

REDDIE, JAMES.—(*Provisional protection only.*)—" An improved " mode of propelling and steering vessels."

" This invention relates to the propulsion of boats or vessels by " means of a vibrating flexible paddle or rudder, the chief object " being to avoid the use of oars and a fixed or rigid rudder, and " to enable boats to be propelled with less manual exertion than " is at present required for that purpose. In carrying out this " object," " a flexible paddle of steel plates, or steel, or whalebone, " or other elastic ribs," is " covered with gutta percha or other " suitable flexible material, so that it may possess the yielding " property of the fishes' tail when moved to and fro in the water." This flexible paddle is " set up edgewise at the stem of the vessel," and operated " by means of a rigid helm, which being moved " from right to left by manual or other power will act as a " propeller after the manner of the tail of a fish.

" To retard or stop the progress of the vessel, the bows may be " provided with hinged leaves or fins, which may be let down in " the water or opened out so as to breast the stream; or the " flexible paddle or rudder may be made hollow, with slides inclining outwards from the upper edge thereof; the depression " of this rudder further into the water may be made to retard or " stop the progress of the vessel. The flexible paddle or rudder " may be applied to both ends of a vessel to facilitate its propulsion " in opposite directions."

[Printed, 4*d*. No Drawings.]

A.D. 1859, March 2.—N° 559.

NEWCOMB, JAMES, and LOVELL, JOSEPH GWYRE.—" Improvements in obtaining and applying motive power, especially " adapted, amongst other purposes, to the propelling of ships " and vessels."

A throttle valve is worked so as to shut off steam near the end of each stroke.

The slide valves are worked by a donkey engine.

The air pump acts also to force water for propelling, and this water is used also for condensing, and may be taken from the ship's well by suitable arrangements when there is a leak.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1859, March 12.—N° 632.

NEWTON, William Edward.—(*A communication from Anson Wolcott.*)—(*Provisional protection only.*)—" An improvement in " endless chain propellers for boats and other vessels."

The buckets of the chain propeller are fixed to chains passing through their centres, and are steadied by diagonal braces.

[Printed, 4*d.* No Drawings.]

A.D. 1859, March 15.—N° 651.

GALLOWAY, George Bell.—" Improvements upon and in " connexion with my former patents, and in the manufacture of " fuel and working steam engines more economically."

The paddle-wheels of vessels may be enlarged in diameter, and inclined at an angle, and the floats caused to feather. Compressed water or air may be used for propelling.

Boilers may be made with divisions to turn round so as to rid them of clinkers. Steam may be superheated by passing through a hot pipe. Propellers for life-boats, to be worked by hand, are described.

The Specification also alludes (without definite description of the plans to be employed) to casing cylinders, surface condensers, working sails from the deck, raising sunken vessels, lubricating pistons, fan blasts, coal-dust fuel, life-boat valves, boat cradles, life preservers, hoisting boats, and various forms of the hulls of vessels, and mode of constructing them.

[Printed, 8*d.* Drawing.]

A.D. 1859, March 16.—N° 659.

PARKER, James. — (*Provisional protection only.*)—" Improve- " ments in lever sails, and in submerged feathering propellers."

The first branch of the invention consists of a wheel revolving by the action of the wind upon sails placed so that they travel in one direction behind a curved screen.

The second branch of the invention consists of floats on an endless chain carried on wheels caused to revolve, so that the floats act on the water in one direction to propel, and then feather as they return along a chamber in the air.

The first branch of the invention is stated to be also applicable to driving vehicles on land and ploughs and mills.

[Printed, 4*d.* No Drawings.]

A.D. 1859, March 19.—N° 702.

HOWDEN, James, and MORTON, Alexander.—"Improvements in apparatus for obtaining and regulating motive power."

One of three cylinders working the same shaft receives high-pressure steam direct from the boiler, while the other two (the pistons of which have unequal areas on their opposite sides) receive the steam from the first. Or the high-pressure cylinder may be in a line with one of the others with the same piston rod. Or the steam may act first on the diminished area of the piston of a trunk engine, and then on the larger area of the other side.

The trunk piston may be joined to its rod by a bolt, surrounded by a tube working in stuffing boxes in slits on the cylinder sides.

The stuffing box of a trunk piston rod has an elastic part forced tight by steam on its outside. A piston packing may be made of one or more rings forced to bear outwards against the cylinder by the pressure of the steam inside.

The slide has an interior space receiving steam.

The valves may be placed in the trunk of an engine.

Superheated steam or the fire gases from the furnace may be used in jackets.

Wire gauze or a permeable substance placed in the passage from the cylinder to the condenser abstracts part of the heat.

The tubes of surface condensers or a refrigerator are bent so that the end by which each is fixed lies in the same direction.

The fire gases for heating water pass up and down through alternate intervals between cylindrical water spaces, or spirally between them, or through intervals with tubes in them. Boilers and flues are strengthened by external and internal rings.

A spring on the screw propeller axis allowing some play to the propeller longitudinally, acts on the throttle valve according to the amount of the thrust, or this may be effected by the varied torsional strain on the shaft, which has a spring coupling for this purpose. Or these spring actions may be used without affecting the throttle valve.

These several plans are described with the drawings, and there are eighteen claims.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1859, March 19.—N° 705.

NEWTON, Alfred Vincent.—(*A communication from Theodore W. Phinney.*)—"Improvements in propelling vessels."

Plungers or solid cylinders work fore and aft in hollow cylinders to propel a vessel.

[Printed, 8*d*. Drawing.]

A.D. 1859, March 23.—N° 736.

ADAMSON, William.—"Improvements in apparatus for pro-"pelling vessels."

A long flat "flap" vibrating angularly about an axis at one end, draws in water to a casing, and by means of valves in the casing or the flap expels it at the return stroke so as to propel the vessel.

[Printed, 6*d*. Drawing.]

A.D. 1859, March 23.—N° 738.

MIDDLESHIP, William. — "Improvements in propelling "vessels."

The screw propeller instead of being worked by the direct pressure of a shaft from the engine, is caused to revolve by a cased turbine, into which water is pumped, or by forming the arms or blades of the screw hollow or with tubes, so as to act like a turbine.

[Printed, 10*d*. Drawing.]

A.D. 1859, March 30.—N° 800.

NEWTON, Alfred Vincent.—(*A communication from H. C. Sergeant.*)—"An improved governor for marine and other steam "engines."

A small additional steam engine is worked so that it meets with a constant resistance, and is so connected with the valves of the working steam engine, which has a varied resistance to overcome, that the first engine regulates the valves and speed of the second engine.

The mode preferred for doing this is by the action of discs with helical projections and stop pins, so as to effect the purpose gradually.

[Printed, 8*d*. Drawing.]

A.D. 1859, March 31.—N° 809.

BATESON, Samuel Stephen.—"Improvements n generating "steam and in the apparatus employed therein."

A "feed coil" is placed in the furnace, and through this is forced, so as to be introduced into the boiler in a highly heated state, either steam, water, or air. Valves are arranged so that the feed coil can be thrown into communication with the boiler, and the supply stopped.

[Printed, 1*s*. Drawings.]

A.D. 1859, April 1.—N° 821.

TOD, WILLIAM.—"Improvements in marine steam engines."

There are two horizontal cylinders, and the four piston rods of each pass through the air pumps, which are inside the condensers. Two are above and two below the shaft. The piston rods are "cotered" into a cross head to work the horizontal connecting rods.

The expansion gear is worked by bevil wheels and worm gear in a manner requiring the drawings to make its description clear.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, April 1.—N° 822.

THOMAS, YVES MARIE.—"An improved propeller for ships, "vessels, boats, and water-wheels."

Vanes or cups or buckets are attached to an "articulated "chain," which by the aid of a sort of railway, governs their positions as they are caused to act on the water by the motion of the endless chain.

[Printed, 6*d*. Drawing.]

A D. 1859, April 4.—N° 843.

RUSSELL, CHAMPION.—"An improvement in the working of "marine engines."

A pendulum is hung so as to oscillate fore and aft, and its motion is used to regulate the throttle valve so that when the vessel is mounting or descending a wave, the engine may be driven in a corresponding manner. This is effected by guides, stop pins, and a rocking shaft with inclines adjusted for the purpose.

[Printed, 10*d*. Drawing.]

A.D. 1859, April 4.—N° 844.

CROOKER, MATTHEW AUGUSTUS.—"Improvements in paddle-"wheels for steamers."

This invention is intended to equalise the action of a steam engine acting through a crank upon the shaft of paddle-wheels, and it may be carried into effect either by regulating the length of radius of each float; or by regulating the immersed area of each float.

In both cases the resistance in the water is to be less when the crank is near its dead point.

[Printed, 10*d*. Drawings.]

A.D. 1859, April 5.—N° 854.

BROWNE, Benjamin.—(*A communication from Philip Kearney Skinner.*) — (*Provisional protection only.*) — " Improvements in " propelling ships or other vessels through water."

The screw propeller is to be placed "very much before the " stern post," and well under the bilge or double screws, or two screws may be employed on shafts at each side of the stern post.

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 9.—N° 895. (* *)

NEWTON, William Edward.—(*A communication from Ernest George Xavier Boileau.*)—" Improvements in steam engines and " boilers."

The working parts are arranged so as to dispense with the use of connecting rods, while causing the pistons to act in a right line.

The pistons acting at right angles to each other of the two cylinders are connected to a double crank, and the pins work in bearings at the ends of the crank arms; the heads of the piston rods work in right lines in guides. The condensing apparatus consists of two chambers partly filled with water and open to each other through a large tube. The chambers contain a number of tubes filled with cold water, and at their upper end have exit and entrance valves and a reservoir. Steam admitted into one of the condenser chambers presses on the water, and forces it into the other chamber in contact with the cooling surfaces of the tubes; it is there condensed and flows back to its former level. Steam is then again admitted into the other chamber, and expels the water into the first chamber, the air above the water with some of the water being forced out of the exit valve into the reservoir which communicates with the boiler, and so on, the water from the condensed steam being pumped into the boiler in a hot state

To supply steam to the cylinders it is admitted into distributing boxes in which there are sliding plates that act as valves, and finally passes into a case where it deposits any grease mixed with it.

The combination for carrying out the last part of the invention consists of a vertical cylindrical boiler surrounded by an annular grate having a slow rotary motion; the fuel is supplied from a hopper; the flame and gases from the incandescent fuel are carried down vertical tubes through the boiler; and the smoke escapes from a syphon tube. The grate bars are arranged in sets which may be lowered.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, April 13.—N° 932.

STEVENS, John Lee.—"Improvements in the fire-grates of "locomotive, marine, and other furnaces."

Each fire-bar rests on projecting points or short arms at its ends, while the centre is formed so as to place most of the weight below the axis on which the bar is free to oscillate through a small angle.

It is intended that by this arrangement in locomotives the onward motion of the engine, in steamers the rolling or pitching of the vessel, and in stationary engines special power, should cause the fire-bars to oscillate and thus free themselves from clinkers.

[Printed, 6*d*. Drawing.]

A.D. 1859, April 26.—N° 1047.

MARSHALL, William.—(*Letters Patent void for want of Final Specification.*)—"Improvements in steam engines."

A high pressure cylinder is placed inside a low pressure cylinder, the latter having an annular piston and two piston rods. A "single compound valve" may be used which has a central cup or recess with a through passage to the back of the valve shell. This valve works on a vertical face with five ports in it, so that the high pressure steam enters the small cylinder and passes to the annular cylinder, and thence through the central cup down a central cylinder face port to the condenser.

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 28.—N° 1065.

RANDOLPH, CHARLES, and ELDER, JOHN.—"Improvements "in steam engines and boilers."

A first portion of the invention has particular reference to "screw" engines, and comprehends improved arrangements for connecting the engine and propeller shafts, and including a means of altering their relative velocities. In one modification of these arrangements, the engine and propeller shafts are in the same line, one fitting and turning in a socket in the end of the other. A clutch is provided by means of which the shafts can be made to rotate together or independently.

An intermediate parallel shaft is mounted in bearings in standards also carrying the contiguous end bearings of the engine and propeller shafts. On this intermediate shaft are keyed two spur wheels, arranged to gear with spur wheels, one on the engine shaft and the other on the propeller shaft. These wheels are proportioned so as to give an increased velocity to the propeller shaft, and can be thrown into or out of gear by means of clutches or otherwise. With this arrangement the propeller may be made to rotate at the same speed as the engine shaft, or at a higher speed, determined by the proportions of the wheels. By providing additional wheels more than two relative speeds can be obtained.

A second portion of the invention relates to the condensers of marine and other engines, and consists in providing in the condenser one or more spiral or helical coils of pipes or tubes for the passage through of the cold condensing water, this water not being mixed with the steam.

The improved arrangement forms a surface condenser, but the improved form or arrangement of the pipes or tubes renders them less liable to injury and rapid wear than those of ordinary surface condensers.

A third portion of the invention relates to marine boilers, and consists in making each separate boiler with two or more up-takes or funnels, whereby a much improved or a more convenient arrangement of the boiler details is obtained.

A fourth portion of the invention relates to marine and other steam engine boilers of the multi-tubular class, and consists in giving the tubes or corresponding passages an inclination down towards the smoke box, in order that dust or soot in the tubes or passages may tend to descend into the smoke box, the descent being aided by the gas currents passing through the tubes or passages.

A fifth portion of the invention relates to marine and other steam engine boilers, and consists in providing for the heating of the water in separate vessels or tanks, and for the pumping of it thence into a comparatively small steam generating vessel or boiler, so that only this small vessel has to be made strong enough to withstand the working steam pressure. In other words, this part of the invention consists in reducing to a minimum the water space of the actual steam generating vessel or boiler, and in heating the whole of the feed water as nearly as possible or convenient up to the boiling point before introducing it into such vessel.

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1859, May 3.—N° 1106.

MILLER, THOMAS WILLIAM.—"Improvements in apparatus "for and mode of generating steam and economizing fuel."

Instead of placing the flues with their longer sides in the same vertical plane with the length of the furnace, they are placed across, and several furnaces are arranged so that the products of one or more passes over one or more of the others.

Boilers are fed by fresh water condensed in refrigerators from the exhaust steam of the cylinders, the waste steam from the donkey engines, and the escape steam from the safety valves, which steam passes through a surface condenser from below upwards, where water circulates by means of tubes open to the external water and appropriate cocks or valves, for the particular description of which the figures are necessary as given in the Specification.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1859, May 5.—N° 1122.

TURNER, HENRY.—"Improvements in steam engines, and "apparatus connected therewith."

The cylinders are larger than usual and are connected with regulating and expansion chambers, so as to allow the steam to be admitted in a certain quantity into one of these and to expand before it acts in the piston. In the Provisional Specification it is stated that the steam is used "at its full pressure for only "a very small part or portion of the travel of the piston within "such cylinder."

The steam is condensed in a surface condenser so placed as to be readily accessible for removal or repairs, and this is cooled by a flow of water caused to circulate by the action of a revolving centrifugal force wheel, which is worked by a donkey engine.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1859, May 13.—N° 1196.

SCOTT, THOMAS.—"An improved surface condenser and refri"gerator."

The condenser is formed of very thin sheets of metal placed very near together, so as to subdivide the steam into thin layers bounded by the metal sheets exposed to water. The sheets are retained in place and form by "a framework, trellis-work, or net"work composed of small tubes or rods interlaced with or com"bined together with or by means of metallic wires," and this is so placed as to be readily accessible for cleansing or repairs.

[Printed, 1*s.* Drawing.]

A.D. 1859, May 13.—N° 1199. (* *)

WHITEHOUSE, WILLIAM.—(*Provisional protection only.*)— "Improvements in steam vessels." These improvements are as follows:—

1. "A double-ended vessel, propelled by two screws, one at "each end, capable of working together, the action of which is "either simultaneous or separate, as occasion may require."

2. A steering wheel raised on a platform above the deck, amidships, the same operating by means of chains or ropes on both rudders at once, by which the vessel can be turned in a smaller space and much more expeditiously than on the ordinary plan.

3. A discharge pipe for waste steam, conducting the steam "by "a transverse pipe over each side of the vessel below the surface "of the water."

[Printed, 4*d.* No Drawings.]

A.D. 1859, May 20.—N° 1249.

SAMPSON, GEORGE ROBINSON.—(*A communication from John Taggart.*) — "A new and useful improvement in propelling "navigable vessels through water."

On an inclined shaft fore and aft in a vessel, a screw propeller is fixed at the lower stern end and works in the water, while another screw propeller on the upper bow end works in the air.

Both being on the same shaft, they may be caused to propel and to produce a lifting effect on the vessel, and the patentee states that in a current, or where the screw propeller in the water drags, the revolution of the other propeller will be aided by this action.

[Printed, 6*d*. Drawing.]

A.D. 1859, May 23.—Nº 1271.

CLARK, William.—(*Provisional protection only.*)—"Improve-" ment in machinery or apparatus for propelling and maneuvring" ship, vessels, and boats."

The propeller is intended to alter the direction of a vessel's motion, and may be at the bow side or stern. It consists of a flat blade on a horizontal shaft, and so placed as to act upon the water in some degree like the single float of a paddle wheel, but in a direction at right angles to the longitudinal line of the keel. When not in use, it is caused to lie flat against part of the vessel, or it may be drawn inboard.

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 25.—Nº 1292.

PRINCE, 'Alexander. — (*A communication from Hermann Hirsch.*)—" Improvements in screw propellers."

The propeller consists of two cones, the axes of which are inclined to one another, while the points are attached to the axis of the propeller. The form is such as can be made by folding or bending parts of a plane surface in a manner described.

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 26.—Nº 1299.

REYNOLDS, Joseph.—" Improvements in propelling vessels."

A vane or float is suspended outside a vessel on a crank shaft on a disc with a stud, and is so guided by arms or guiding rods, as to keep it nearly in a vertical position while it is worked in the water by the revolution of the shaft, while it is free to yield when borne forwards to resume its place for another stroke.

[Printed, 10*d*. Drawing.]

A.D. 1859, May 31.—N° 1339. (* *)

SMITH, William.—(*A communication from John W. Nystrom.*) —"This invention relates to a novel construction of hydraulic " pontoon or pontoon dock supplied with steam power, and " capable of being steamed or propelled to the place of operation." " It consists in forming a vessel or pontoon of suitable " dimensions, somewhat like a ship of considerable breadth " and small draft in proportion to her length, and constructing two hollow towers, one at the bow and the other at " the stern. The vessel or pontoon is divided into a number of " water-tight compartments, into which, for the purpose of sinking the pontoon or vessel, water is admitted, and from which " the water has to be pumped when the pontoon and its load " have to be raised. The two hollow towers are water-tight, and " extend to the bottom of the pontoon, and communication is " effected between them through a tunnel extending fore and " aft. In one of these towers" are placed "the boiler and " fuel stores, and in the other the steam engine for driving propeller and pumps, and also the pumping machinery, hoisting " tackle, and apparatus for performing the various duties required " in and about the pontoon or dock. The decks of these " pontoons are constructed of great strength, suitable for supporting the weight and strain of a ship resting thereupon, and " the pontoon is strengthened longitudinally and transversely by " girder bulkheads or partitions, suitably disposed for giving the " greatest amount of strength with the least weight. The hollow " water-tight towers are carried to a height from the deck sufficient to enable the pontoon to be sunk to the requisite extent " without submerging the tops of the towers, and within these " towers suitable staging or means of access, and arrangements " for performing the docking of ships and other purposes, as " herein-before mentioned, are arranged, so that the men have free " access between the towers and out at the tops of and around " them; the funnel or smoke pipe from the boiler, and the steam " blow-off and other pipes, are carried up to the top of the towers, " so that no inconvenience or interruption to the working of the " machinery or performance of other operations on board will " occur during the submersion of the pontoon."

These pontoons may be employed fcr raising a ship out of water for repairing or other purposes, raising stranded ships and submerged bodies, lifting and removing heavy weights and various duties about rivers, docks, and coasts. The pontoon is fitted with a propeller, which is worked by the engines. The propeller can be disconnected from the engines when they are otherwise employed.

[Printed, 1*s*. Drawing.]

A.D. 1859, June 3.—N° 1366.

PENRICE, Herbert Newton.—" Improvements in machinery " for propelling vessels."

The floats of this propeller are in one or more swinging guide rods, and motion is given to these rods and to the floats sliding along them so that each float works in a direction fore and aft and slightly inclined to the horizon, and is then lifted out of the water by the elevation of the guide rod to return for a new stroke.

[Printed, 10*d*. Drawing.]

A.D. 1859, June 6.—N° 1382.

DAVIES, George.—(*A communication from Augustus Jouan.*)—(*Provisional protection only.*)—" Improvements in paddle wheels " and screw propellers for steam vessels."

The paddle floats and the vanes of screw propellers are made with a part of each elastic and in sections so as to adapt themselves to the action required in the water.

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 11.—N° 1415.

JAMES, Jabez.—" Improvements in obtaining and applying " motive power."

The action of ratchet wheels and chains, or of fixed or chain gear with palls, is employed either to wind up a weight by the reciprocating movement of a piston in a cylinder which works on the palls alternately, or to turn a wheel (instead of using a crank) by causing a chain worked to and fro by the piston, to gear into a ratchet wheel on a shaft, and so convert the reciprocating motion into angular motion in one direction. The valves of the cylinders may be worked by the action of stops at the end of each stroke, and flexible tubes may be used for the steam or water power.

[Printed, 1*s*. Drawings.]

A.D. 1859, June 15.—N° 1438.

HUMPHRYS, Edward.—"Improvements in marine steam "engines."

Two or more high pressure cylinders, or one annular high pressure cylinder, may be fixed on the top of the low pressure cylinder, and the high pressure piston rods pass through to the low pressure piston, so that when the engine is worked on Wolfe's plan, only one connecting rod is required to transmit the power to the crank.

[Printed, 10*d.* Drawings.]

A.D. 1859, June 20.—N° 1483.

NEWTON, Alfred Vincent.—(*A communication from James Havey Washington.*)—"Improved apparatus for blowing off water "from steam boilers."

The blow-off pipe in the boiler is hinged, so that it may rise and fall with the level of the water in the boiler, being supported thereon on a ball float.

The end of the pipe terminates in a perforated ball (or in stationary engines a funnel), and when the outer cock is opened the water blown off is that from the surface. When the ball sinks until it is caught by a stirrup any further and dangerous lowering of the water will blow off steam and thus sound an alarm.

[Printed, 6*d.* Drawing.]

A.D. 1859, June 20.—N° 1485.

ROWAN, William.—"Improvements in the generation of "steam."

Steam is desiccated or superheated, by passing it between two tubes, one of which is within the other, while the heated products of combustion from the furnace pass through the inner tube to heat it.

[Printed, 6*d.* Drawing.]

A.D. 1859, June 24.—N° 1518.

CHESNEAU, Auguste.—"Improvements in paddle wheels."

Feathering paddle floats revolve on their axes freely and are kept in a vertical position during their course round the shaft by a weighted piece at the lower edge of each float.

[Printed, 8*d.* Drawings.]

A.D. 1859, June 25.—N° 1529.

BODEN, John, and CLARK, William.—" Improvements in " apparatus for superheating steam."

The feed water is heated, and the steam is superheated by passing them along tubes in the up-take and other tubes above the ends of the boiler tubes.

[Printed, 10*d.* Drawing.]

A.D. 1859, July 2.—N° 1584.

HIRSCH, Hermann.—" Improvements in screw propellers."

The propeller, which acts like a screw propeller, is shaped by folding and bending two symmetrical portions of a plane figure so that they become respectively parts of two hollow cones which if they were completed would touch each other along a line coincident with the axis of the propeller, or respectively touch on opposite sides a cylinder or conoid having for its axis the axis of the propeller. " The principle of this invention " is " the making " screw propellers of hollow cones."

[Printed, 6*d.* Drawing.]

A.D. 1859, July 7.—N° 1616.

SMITH, John.—" Improvements in propelling ships and other " vessels."

Air channels are formed inclining upwards in the hull of a vessel, and air is forced into them, which in its passage along them propels the vessel as it rises to the surface to escape.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1859, August 4.—N° 1800. (*·*)

CORDNER, Edward James.—The invention consists " in " applying to the saving of life and property from shipwreck and " to other purposes a set or succession of kites, or several com- " bined sets of kites so arranged and combined, that the power " exerted by the several kites of a set shall be exerted at one point, " or upon a single line, rope, or chain." The kites are generally of a hexagonal shape covered with calico, linen, or other material, and are so constructed as to pack into convenient sized boxes.

The invention is also applicable " to various other purposes, " such as the propulsion of vessels in conjunction with sails or

" steam, to the raising of sunken ships, or indeed to almost any " purpose where a nearly unlimited power of traction or elevation " is required."

[Printed, 4*d.* No Drawings.]

A.D. 1859, August 9.—N° 1835. (* *)

DUNN, THOMAS.—" Improvements in machinery and apparatus " for elevating and regulating the level and flow of liquids, part " of which is applicable for propelling vessels." The improvements " in machinery and apparatus for elevating fluids, consist " in certain improved modes of constructing endless chain pumps. " A chain of balls or cylinders, made of wood or other material, " is put in motion, either in a vertical or diagonal position; one " side of the chain works within the pipe or tube through which " the fluid is raised, while the other side descends free. These " endless chains are also applicable to propelling vessels, and " they may be applied to the stern or along the keel, or any part " of the length of the vessel. When applied along the keel, the " vessel in shallow water or on banks, may be rolled forward on " the cylinders of the propellers, or on rollers independent of the " propellers."

The " improvements in machinery and apparatus for regulating " the level and flow of liquids, are as follows:—When water or " other fluid has been elevated into a cistern by means of the " improved machinery above described or otherwise, the fluid is " kept to the same level by a float fitting loose on the spindle of " a valve. This last part of my invention is also applicable to let " off water from steam pipes. In this case the valve is placed in " the off pipe, and the float is contained in a vessel in which the " water accumulates, consequently when there is enough water " to lift the float, the valve is opened to allow the water to run off. " The level and flow of fluids can also be regulated by a graduated " weighted lever connected to a valve. When the pressure of the " fluid is sufficiently great to raise the valve, the fluid will flow " through the valve until the pressure is reduced to the point " fixed upon."

Another part of the improvements " in machinery or apparatus " for elevating fluids, consists in making the pump barrel to move " to and fro on the feed and discharge pipes, which are furnished

" with feed and delivering valves. By this means a double-acting " pump is obtained with a single pump barrel."

[Printed, 1s. 4d. Drawings.]

A.D. 1859, August 13.—Nº 1876.

SLOMAN, Elias.—(*A communication from Gottfreyd May.*)—" An improved feed water and heating apparatus."

The water intended to feed the boiler is allowed to enter and fill a hollow tap, which is then turned round and empties the supply into the boiler. The steam which then fills the hollow is liberated, by the backward action of the tap, into the feed water, and is condensed while it heats the water; in a modification of the plan, the apparatus fixed on the top of the boiler empties the water into a tube. This tube and the opening of the tap in the first method are so arranged that when the water is filled up to its proper maximum height, it closes the aperture and no more water then enters until the level is lowered.

[Printed, 1s. 4d. Drawings.]

A.D. 1859, August 16.—Nº 1887.

BATCHELOR, Henry.—" Improvements in steam and other " motive power engines."

" The improvements relate, first, to where two pistons, connected " together so as to work simultaneously, operate in the same " cylinder or in separate cylinders placed opposite each other," the motive power acting only on the outer surface of each piston. To afford additional means of escape for the exhaust steam or other power, besides the exhaust ports, "a series of passages" communicating with the eduction pipes and hot water cistern, are formed round the cylinder or cylinders.

And, secondly, to means of communicating motion to the main axis in engines of the sort above described. Two half cranks are employed, "the pin of each of which passes into " girders or traverses on opposite sides of" the connecting parts of the pistons. These half cranks travel in opposite directions. When two of the compound cylinders are working together, "the " main shaft will be divided into three parts, the outer or end " parts of which travel in the same direction," and the middle part in the opposite direction. When one such cylinder is employed, the main shaft is in two parts.

To regulate the flow of steam or other power the pin of the crank "is connected to this valve or valves from within the "cylinder."

A drawing of part of a pair of marine engines of the sort described is given.

[Printed, 1s. 10d. Drawings.]

A.D. 1859, August 29.—N° 1960.

MERITON, THOMAS.—(*Provisional protection not allowed.*)— "Improvements in governors for regulating the speed of marine "and other engines and machinery."

A weighted disc or balance is placed on a shaft turned by the engine, so that motion is communicated to it through the intervention of a spiral spring and grooved inclined feather pieces. As the speed of the engine raises the spring at more or less tension, it causes the disc to travel along its axis on the shaft so as to act upon the throttle valve.

[Printed, 6d. Drawing.]

A.D. 1859, August 30.—N° 1969.

BARNES, JOHN BOWEN, and LOACH, JOHN.—"Certain improvements in oars for impelling boats, as also in the rowlocks "in which they work."

The oar is in two parts, one outside the other inside the boat. The parts are both connected to a union box of two plates so hung on a crutch or pivot, as to enable the oar to be raised or lowered. The adjoining ends of the two parts gear into each other with segment racks or parts of cogwheels, and thus when the rower sits facing the bow and pulls the inner end of the oar it acts on the outer part through the gearing and so causes it to propel the boat forward by a stroke. The blade of the oar may be hollowed and caused to turn on its axis so as to be self-feathering.

[Printed, 10d. Drawing.]

A.D. 1859, August 30.—N° 1973.

EASTMAN, THOMAS.—(*A communication from James Shepard.*) —"Improvements in screw propellers."

The invention consists in shaping the blades of screw propellers according to a form given in the drawings or "any similar or "equivalent form." The shape of a blade (looking at its broad face) is somewhat like that of the string pegs of a violin with a slight inclination of the surface.

[Printed, 1s. Drawings.]

A.D. 1859, August 30.—N° 1976.

HUTTON, Henry.—"An improved lubricator."

The oil for lubrication, after being filtered in a vessel, descends into a brush of bristles or hair adjustable according to the amount of oil to be delivered to or "licked" by the shaft or bearing which touches it in its course. The lubrication is specially adapted for the engines of screw propellers.

[Printed, 8d. Drawing.]

A.D. 1859, September 2.—N° 2004.

CLOUGH, William.—(*Provisional protection only.*)—"Improvements in machinery or apparatus for propelling vessels "on water."

Paddle-floats on endless chains over rollers are caused to work through the water to propel a vessel. The cylinders have teeth to catch in the chains. The links of the chains lock into one another, so as to make a rigid band.

[Printed, 4d. No Drawings.]

A.D. 1859, September 14.—N° 2091.

GUMPEL, Charles Godfrey.—"Improvements in the application of motive power to the propelling of vessels."

Water is drawn in and then forced along a channel under water to propel a vessel. For this purpose reciprocating cylindrical pumps may be employed, or a semi-cylindrical pump with an angular motion. Valves and directing pieces which can be worked on deck, are used to regulate the entry and discharge of the water.

The steam may be condensed in a chamber formed along the channel traversed by the water.

[Printed, 10d. Drawing.]

A.D. 1859, September 21.—N° 2151.

NEWTON, William Edward.—(*A communication from Messrs. Mazeline & Co.*)—"An improved mode of and apparatus "for condensing the waste steam of marine engines."

The escape steam issues by a pipe with a contracted conical nozzle, so placed in another pipe communicating with water, that the vacuum caused by the rush of steam causes water to follow and to condense the steam without the noise usually attendant on its escape.

[Printed, 8*d*. Drawing.]

A.D. 1859, September 24.—N° 2172.

TODD, JOHN.—(*Provisional protection only.*)—" Improvements " applicable to screw propellers in the propulsion of vessels."

A circular, bell-mouthed, or arched guard is fixed round the well of the propeller outside the course of the arms, so as to protect it from things which would otherwise be drawn in and foul the propeller. It may be also made shot proof.

[Printed, 4*d*. No Drawings.]

A.D. 1859, September 29.—N° 2202. (* *)

STEVENS, CHARLES.— (*A communication from Yollet, Babin, and Gâche, ainé.*)—This invention relates to steam dredging. A screw steam vessel, having eight compartments for the reception of the mud, which is raised by pumping, is employed; these compartments are, when empty, above the water line, and they severally have communication with the sea or outer water, by means of separate wells or outlets, which open through the bottom of the vessel and are closed by suitable valves. The steam engine cylinders are placed at an angle and work direct, and together with the boilers are disposed near the stern. The pump shaft is in a line with the propeller shaft, and is continued beneath the mud hoppers to about midship, where it carries a toothed pinion; this pinion engages with two spur wheels which are disposed one on each side, and these wheels by means of crank pins give motion to the connecting rods which actuate the two transverse vibrating beams whereby the pumps are worked. These pumps are placed, one on each side the vessel, in communication with the suction pipes which, depending from junction bends, are capable of adjustment to any depth up to 35 feet, their outer ends being bent towards each other, and united to a perforated barrel or "wallower," which, together with the suction pipes when not in operation, can by the aid of a windlass be raised to a horizontal position, the barrel coming above the surface beyond the stern; the pumps deliver into spouts, which convey the muddy matter to the several compartments; when these are filled, the vessel steams out to sea or to any other suitable place where, by opening the hopper valves, the mud may be deposited.

[Printed, 1s. 2d. Drawings.]

A.D. 1859, October 14.—Nº 2345. (* *)

JACK, JAMES.—"Improvements in steam engines and boilers "for marine and land purposes."

These improvements consist "in constructing condensing "engines with the addition of extra high-pressure steam cylinders, "and an apparatus or chamber placed in the exhaust steam "passage between the cylinder and condenser for heating the "feed water, and lowering the temperature of the steam." Parallel to, or in a direct line from the piston rods of the condensing cylinders, one or more smaller cylinders are placed, into which are carried continued piston rods, or rods connected with the pistons of both cylinders, so that they all move at the same time. In marine condensing engines, steam is admitted "at a "superheated or high pressure to one side of the pistons in the "small cylinders, and into pockets or chambers constructed "within them, so that when the pistons are moved about half "stroke, the slide valves admit the whole or part of the steam in "the pockets (or chambers) to the corresponding sides of the "pistons in the large cylinders, and move them in the same "direction. The superheated steam, with the remaining portion "of the steam in the pockets, is admitted to the opposite side of "the pistons for the return stroke."

An upright tubular boiler is described, combined with a superheater "heating the steam by the same flames that generate it." Also a superheater, with elliptic flues or tubes made of two sheets of metal rivetted at the side. Also a boiler with horizontal tubes and annular and concentric cylinders.

[Printed, 1s. [illegible] Drawings.]

A.D. 1859, October 15.—Nº 2360.

ELDER, JOHN. "Improvements in steam and other engines."

The eccentric which works the valves is placed on the main shaft, and drives a wheel "fitted upon the shaft carrying the "ordinary arrangements connected with the slide valve move-"ment;" or is used in conjunction with a special "arrangement

" of ports, valve seats, and slide chests," described by the inventor as follows:—" I construct each cylinder with two small slide " chests, one at the top and the other at the bottom of the " cylinder, and I make the steam ports short and opening direct " into the top and the bottom of each cylinder, the eduction or " exhaust port being in each case below each steam port." The slide rods are not connected together, but are actuated from the excentrics on the main shaft, either directly or through the intervention of a weigh shaft and spanner.

A pair of marine engines with the improvements are shown in the drawings.

[Printed, 10*d.* Drawings.]

A.D. 1859, October 18.—N° 2384.

HIRSCH, Hermann.—(*Provisional protection only.*)—" A new " propeller for ships."

Hinged blades are moved fore and aft in the water, and so acted upon by stays as to cause them to expand when moving in one direction, and so propel the vessel, while they collapse for the return stroke.

[Printed, 4*d.* No Drawings.]

A.D. 1859, October 21.—N° 2411. (* *)

PRIDEAUX, Thomas Symes.—" Improvements in the con- " struction of ships and rafts." " This invention has for its " object to accelerate the speed and increase the strength and " stability of ships by improving the form of the hull, making it " shot proof, lightening the weight of the masts and spars, and " employing the ejection of water or a submerged paddle wheel " or paddle wheels " at the middle or fore part in combination with " a propeller at the stern as a means of propulsion; also to pro- " vide them with portable rafts, easily put together and capable " of being advantageously substituted (for many services) for a " portion of the boats at present carried, the space for which will " be curtailed by the shortening of the upper deck."

To promote the motion of a ship through the water in a right line, and prevent oscillation or pitching as her motion is accelerated or retarded, " it is desirable that the shape of the bow be " such as so to divide the force of resistance of the water " opposing its passage, as to cause it to deflect the bow from the "act of motion equally in all directions, that thus the pressure "on every side being balanced, there may be no influence exerted "on the bow tending to divert the ship from her true course. "This object is to be obtained by making the bow conical, with "the point of the cone about 1/6, or from 1/7 to 1/5 of her depth of "immersion (not including the keel) from the surface. This "conical form of bow has also another advantage, viz., that the "angle which divides the water is more acute." On each side, behind the conical bow, are constructed chambers "to which the "water is admitted from the exterior, and forcibly ejected at "the bottom or sides backwards in a line with the keel, thus "acting, in combination with the stern propeller, to accele"rate the speed of the ship."

[Printed, 1s. 6d. Drawings.]

A.D. 1859, October 24.—N° 2432.

NEWTON, William Edward.—(*A communication from Rollin Germain.*)—" Improvements in paddle wheels."

The object of the invention is to feather the paddles. The wheel is formed of two rings. The paddles are thick in the middle, and tapered towards the edges. They are hung on "gudgeons or on a shaft passing through the middle of each "paddle," and connected with the two rims. The upper corners of the paddles are turned in opposite directions. The paddles are held by india-rubber or other springs, which hold them "in a "line with the rims" in the air, but yield in the pressure of the water to allow them to act in the water. The curve of the upper corners of the paddles makes the pressure greater on one side than the other, and tends to turn the paddles when they strike the water.

[Printed, 8d. Drawing.]

A.D. 1859, October 26.—N° 2448.

HACKWORTH, John Wesley.—" Improvements in dynamic "valve gear, applicable to locomotive, marine, and other "engines."

For a direct acting horizontal engine there is an excentric on the main shaft vent to the driving crank, and with its extreme throw opposite to that of the crank.

The rod of the excentric has an eye connected to a sliding block working in a T-shaped lever at the end of a shaft, of which the bearings have their centres distant by the same interval as the extreme centres of the excentric, and directly above the shaft. A horizontal rod is attached to the excentric rod and to the valve strap, and by the action (which cannot be well described without the drawings) the "lead motion" and reverse motion can be easily regulated.

In locomotives, the bearings carrying the reversing shaft are fixed to the main bearings of the driving shaft. When outside cylinders are used, a parallel sliding frame is attached reaching across the boiler.

"Another part of the invention consists in having an excentric "rod to work the lead motion, and another independent rod to "work the variable expansion and reverse motion, the latter rod "being connected by a link of equal length with the former, connecting it to the extreme end of the excentric rod, whereby the "said rods are kept parallel with each other. The valve strap is "connected immediately to the link before mentioned for working the lap and lead. The back end of the expansion or "reversing rod works by a sliding block, or on a fan in the "reversing shaft. Thus, by throwing the slot of the reversing "shaft from the vertical to the angular position, either right or "left, the reversion motion will be effected."

"One distinctive feature of the invention is that of deducing "two motions from one excentric crank or radius pin at right "angles with each other, whereby each, independently of the "other, yields at the proper time its full quota of movement to "the valve."

[Printed, 2s. 4d. Drawings.]

A.D. 1859, November 7.—N° 2531.

CHARLTON, Henry. — "Improvements in the method of "navigating steam ships or vessels, and in the apparatus connected therewith."

The paddle wheels are on separate shafts, and an intermediate shaft has a piece running on it and revolving with it, which carries a plate so placed that the pin of a paddle crank may take into a hole in the plate, and so gear the two wheels together. The motion of this piece to couple it with the pin and paddle shaft, or detach it, is regulated by the action of a piston in a cylinder, to which steam can be admitted at one side or the other. The separate engines of the two paddle wheels have separate throttle valves, so that their relative speed may be regulated.

The purpose of the invention is to obtain assistance from the paddles in steering.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, November 8.—N° 2537. (* *)

POWELL, HENRY BUCKWORTH.—"The protection and pre-
" vention of fouling or injuring by foreign matters the screws,
" paddles, rudders, and stern-posts of steam-ships or other
" vessels." To accomplish the object of the invention, a grating or open framework made of wood, iron, or any other suitable metal or material, is hung upon hinges or pivots, or by other means, towards or at the stern of the vessel; and may be partly or totally immersed in the water, or entirely free therefrom; and may be fixed on one or both sides of the screw, paddles, rudder, and stern-post of the vessel. Attached to this grating or framework is an arrangement of ropes, chains, or other similar apparatus, to draw or swing it in the position required, which may be worked from the inside or outside of the vessel, guided by wheels or pullies fixed thereon. When it is not required to use the grating, it is drawn close against the side of the vessel in the direction of the bow or front of the vessel; and when needed, in the direction of the stern, when it encloses the space occupied by the screw, rudder, or other machinery of the ship, serving as a guard to keep off any foreign matters in the water. A similar apparatus is applicable to paddle steamers or other vessels. Also, instead of the grating being suspended on pivots or hinges, it may be made to slide up and down by an arrangement of rods and guides, or similar apparatus fixed to the stern. Or, it may be suspended at the stern free from the water, and allowed to swing down when required. It thus offers no impediment to the speed of the vessel when not in use.

[Printed, 8*d*. Drawing.]

A.D. 1859, November 9.—N° 2550.

SPILL, GEORGE, and SPILL, DANIEL.—" An improvement
" in the manufacture of bands for driving machinery, and for
" various other purposes."

Bands to be used for towing boats on canals (among other purposes) are made of steel wires or strips covered with hemp and then woven as warps, with some fibrous material as a woof, after which the fabric is rolled and coated.

[Printed 4*d.* No Drawings.]

A.D. 1859, November 10.—N° 2561.

DAY, WILLIAM.—(*Provisional protection only.*) — " Improve-" ments in propelling vessels, which said invention is also " applicable for converting the force of the wind into a motive " power to be used in any convenient way either for stationary " or moveable purposes."

Wheels with floats to be used as paddle wheels on a vessel, or as water-wheels or windmills, are caused to feather their floats either by guide rods acting on the floats, or by a cogged rim acting on their separate axles worked by a small fixed pinion.

[Printed, 4*d.* No Drawings.]

A.D. 1859, November 23.—N° 2654. (* *)

EASTMAN, THOMAS. — (*Provisional protection only.*)—" Im-" proved means of raising the blades of screws employed to " propel ships, and apparatus for getting at such screws, and for " performing other operations under water." The "invention, as " far as concerns the raising of screws, refers to such as are " formed with blades capable of being removed from the boss, " and especially to those screws the subject of provisional protec-" tion granted to me the 30th August 1859, No. 1973."

A screwed shaft is passed through the lower deck, or other suitable support, over the screw employed to propel the vessel, and worked up and down, as required, by means of a nut resting on the deck or support. Instead of a screwed shaft and nut a rack and pinion may be employed. To keep the lower end of the shaft in its true position, a guide in "the shape of a cross head or bar " is passed through a loop therein;" "both ends of the bar are " notched, and work on rails provided for the purpose; the " extreme end of the shaft carries a hook, and each screw blade " has an aperture or 'eye' formed for the reception of the hook. " The 'well,' so objectionable, particularly in ships of war, is " entirely dispensed with.

"The apparatus for working under water consists of a tube " closed at bottom, formed of some waterproof material, or fabric

" made waterproof, and fitted at intervals with hoops for keeping
" the tube distended; a rope ladder is suspended or placed inside
" the tube, and sight holes fitted with glass or other transparent
" material are formed at intervals; one or more pairs of water-
" proof sleeves, provided or not at their extremities with elastic
" gloves, are fitted in the tube.

"To hoist the screw blades, the screwed shaft is lowered to its
" fullest extent; a man enters the tube and goes down the ladder,
" places his arms through the sleeves, and disconnects one blade
" from the boss, and engages the hook at the end of the shaft
" into the eye in the blade; the threaded shaft is then raised,
" whereby the blade is drawn up; another hook, that of a tackle,
" is hooked into the eye, the first hook is then disengaged, and
" the blade is hauled up by the tackle through an opening in
" the lower deck. The propelling screw shaft is turned to bring
" another blade into position for being raised, and the operations
" are repeated."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 24.—N° 2665.

COLLINS, WILLIAM SANGER, junr., and CHARD, FREDERICK JAMES.—(*Provisional protection only.*)—"Improvements " in apparatus for propelling vessels."

The paddle floats are fixed on a bar, one end of which moves round outside the vessel on a crank or paddle shaft, and the other slides fore and aft through an eye on a pin forward or abaft of the crank axis, and in the same horizontal line. This will cause the floats to dip nearly vertical, and to leave the water for the return stroke. Several such cranks and bars may be used together.

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 25.—N° 2666. (* *)

SMITH, WILLIAM.—(*A communication from Eugene Lacroix, fils.*)—This invention relates to a novel mode of fitting or applying propellers, and to the mode of working or driving them, so that the full or effective power of the propelling engine may be transmitted or exerted, whatever the variation may be in the immersion or load line of the boat or other vessel. By this novel mode of applying the propelling apparatus, the wash of the receding waves produced by the action of the propeller, is rendered harmless to the banks of canals. "Instead of fitting the propeller "or propellers (whether screw, paddle, or other form) in the ordinary manner of applying and working them, I mount the propelling instrument or apparatus in a frame which is capable of "being raised or lowered at pleasure by means of worm and "wheels and rack gearing to an extent between the limits of the "lightest and the heaviest load lines or lines of immersion." The sliding frame just described is fitted in a suitable recess or trough-like chamber, so that the water is only discharged at the end of the chamber. Thus, while the vessel only produces such waves in advance as are due to the speed at which it is propelled, the washing away of the banks produced by the action of the propeller is avoided. According to this arrangement a recess or opening is formed at the after part of the vessel, which is thus divided as it were into two hulls, or there may be two partition or division pieces, either of wood or metal fixed there, one on each side, between which the propeller would work.

[Printed, 8*d*. Drawing.]

A.D. 1859, November 28.—N° 2686.

WILLIAMSON, Alexander William, and **PERKINS**, Loftus. — (*Provisional protection only.*) — "Improvements in "machinery for propelling vessels."

A float board turning on a vertical axis cut through its centre, moves fore and aft on a horizontal arm projecting from a vertical shaft which has angular motion given to it to and fro. Thus the float presents its full surface to the water (being regulated in this by stop pins) and feathers for the return stroke.

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 29.—N° 2695.

WENHAM, Francis Herbert. — "Improvements in steam "engines."

When high-pressure engines are used with condensing engines, the pistons of the former are caused to move at a greater speed than those of the latter, by making them work the crank through a pinion.

The steam after working the high-pressure engines is superheated before it passes to the condensing engines.

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 29.—N° 2701.

COLWELL, CHARLES.—(*Provisional protection only.*)—"An "improved means of propelling sea-going vessels without the use "of either paddle wheel or screw propeller now adopted."

"A submerged double-actioned oscillating double-floated pro- "peller, which is capable of direct action without loss of power, "with increase of speed, at a less cost of fuel, and by which a "ship may be steered, or even turned in its own axis in case of "accident to the rudder, with the further advantage of applying "this invention to either the stern or sides of the vessel."

[Printed, 4d. No Drawings.]

A.D. 1859, December 1.—No. 2719.

SILVER, THOMAS.—"Improvements in apparatus for governing "or regulating the speed of steam and other engines."

Two axes, one within the other, and free to revolve separately, are connected by bevilled wheels in such a manner that when the speed of one axis is more than the other, a sliding tube will move the throttle valve.

One of the axes (with a small fly wheel) being turned by the engine, and the other by a power strictly uniform or with an equalising resistance such as fan leaves, the difference between the speeds of the axes is brought to bear upon the throttle valve.

[Printed, 8d. Drawing.]

A.D. 1859, December 2.—N° 2732.

ALDRIDGE, WILLIAM HENRY.—(*Provisional protection only.*) "Improvements in paddle wheels or propellers of steam ships."

The paddle floats are carried on horizontal bars, the ends of which are coupled to cranked shafts working in unison, so that the floats are always vertical, and are lifted out of the water for the return stroke.

[Printed, 4d. No Drawings.]

A.D. 1859, December 5.—N° 2748.

HAWKINS, JOHN, and HAWKINS, CHARLES.—"Improve- "ments in the construction of furnaces for consuming smoke,

" applicable to stationary and marine boilers, and other closed " fire-places."

The air is admitted to the fire-bridge through pipes which traverse the heated portions until it is highly heated, and issues through small holes to perfect the combustion of the gases.

The pipes enter in a vertical position and have a joint, so that the bridge may be elevated or depressed.

While the bridge is stationary, gas is admitted in small jets to consume the products of the furnace. A self-acting apparatus opens the air-ways at once when the furnace doors are opened to put on fresh fuel, and the air-ways are caused afterwards to close gradually.

[Printed, 1*s*. Drawing.]

A.D. 1859, December 6.—N° 2758.

SELLS, Charles.—" Improvements in marine steam engines " for driving screw and other propellers."

The engines are intended to be worked on the expansion principle, and there are three cylinders and two condensers.

The expansion gear is worked by a train of wheels adjustable in position according to the amount of expansion required, and the slide valve has additional steam ports in it which increase the extent of steam way when the lap is such as to cut off the steam early.

These arrangements for the expansion gear and the slide valve cannot be clearly explained without the drawings.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, December 6.—N° 2764.

POTTS, Ferdinand.—" Improvements in the mode of manu- " facturing or finishing tubes for certain purposes."

Tubes of iron or other metal for tubular boilers, tubular condensers, or other purposes, are coated externally with copper, and finished by drawing through a " smooth steel finishing hole." The copper prevents the surface of the iron oxidising, and the iron thus coated is harder and stronger than the brass or Muntz metal now used.

[Printed, 4*d*. No Drawings.]

A.D. 1859, December 7.—N° 2766.

SIEVIER, ROBERT WILLIAM.—(*Provisional protection only.*)—"Improvements in the method of an apparatus for regulating "the speed of steam engines connected with the propelling of "steam boats or ships."

A tube is suspended inside a vessel, near the propeller, and is open to the water outside, and the varying immersion of the propeller causes a balanced float in the tube to rise and fall and thus to act upon the throttle valve and regulate the speed of the engine.

[Printed, 6*d.* Drawing.]

A.D. 1859, December 7.—N° 2769.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Nicolas Hippolyte Labrousse.*)—(*Provisional protection only.*)—"Improvements in marine steam engines for driving screw and "other propellers, and in screw propellers."

One part of the invention consists in lining steam cylinders and the piston with wood coloured white, and the slide valves and similar parts with felt. A pipe supplies steam at the back of the valves, and a screen is placed to prevent friction and shocks on the valve seats.

Another part relates to a mode of disconnecting and raising a screw propeller. The upper part of the bearing in the rear guide is raised, the axle is disengaged, and by means of screws, springs, and a key, the propeller is detached and the shaft is drawn inwards by a screw thread and gear, after which a slide closes the stuffing box.

Plumbago is to be applied as a coating for propeller blades.

[Printed, 4*d.* No Drawings.]

A.D. 1859, December 13.—N° 2830.

BARLING, JOHN.—"Improvements in propelling vessels."

Water is pumped by pistons with cupped leathers into a receiver within a vessel, with an air chamber to maintain an equable pressure, and it is allowed to escape by regulated apertures to propel the vessel.

To assist in turning the vessel water may be forced out laterally at the bow or stern.

[Printed, 8*d.* Drawing.]

A.D. 1859, December 15.—N° 2850.

BETTLES, Francis John.—(*Provisional protection only.*)—"Improvements in apparatus for propelling vessels."

Paddles or floats are used, "made of wood or metal, or the "two combined, attached to an endless band or chain passing "over two or more wheels, one or more wheels giving motion to "the band; by this means a lengthened sweep of the paddles is "obtained instead of a short dip, which is the only result of the "present paddle wheels. By this means greater power and "increased speed are given. The propelling apparatus may be "worked by steam power or otherwise."

[Printed, 4*d.* No Drawings.]

A.D. 1859, December 19.—N° 2888.

SYMONS, Thomas.—(*Provisional protection only.*)—"Improvements in propelling vessels through water."

"The invention relates to the propulsion of men-of-war and "other ships or vessels, and consists in placing two submerged "screw propellers one above the other on different horizontal "shafts working in an aperture in the dead wood of the vessel. "Each of these propellers being of a less diameter than the "solitary one in present use, may be driven at a greater speed "without producing the like vibration, and the risk of their "fouling by floating materials or being struck by shot will be "greatly diminished."

[Printed, 4*d.* No Drawings.]

A.D. 1859, December 23.—N° 2924.

HYDE, John, and HOOPER, John Hill.—(*Provisional protection only.*)—"Improvements in propellers of steam vessels on "canals."

"The paddles are placed vertically on a bar, and are curved. "This bar is forked at each end. The forked ends of the bar are "attached to cranks, so as to allow the cranks to turn round. "The revolution of the cranks gives an oscillating motion to the "bar. One, two, three, four, or more sets of cranks may be "used as required. The above description applies equally to "each side of the vessel."

[Printed, 4*d.* No Drawings.]

[illegible] December 30.—N° 2987.

[illegible] **[illegible]**.—"A new method of dragging boats [illegible] water passed through canals or rivers, or [illegible]"

[illegible] lock is used to turn a wheel and wind up a [illegible] to the vessel.

[illegible] may be admitted into a submerged flexible tube [illegible] on the boat, and this swelling of the tube will [illegible] to be propelled.

[illegible] Drawing.]

A.D. 1859, December 30.—N° 2989.

[illegible] **William Edward**.—(*A communication from Guillaume* [illegible] *Provisional protection only.*)—"A new system of [illegible] for steam boats or other vessels."

[illegible] apparatus called a "rower" is constructed by "placing a number of floats or paddles parallel to each other and at a suitable distance apart, the whole being united together by [illegible] rods at top and bottom forming framing; this combination is fixed to three or more shafts, which projecting from the "vessel terminate in cranks. One of these shafts is motived by "the steam engine and carries the others with it in its revolu- "tions, thus at each turn of the shaft the whole apparatus is "plunged into the water, giving a direct propulsion to the vessel "similar to that given by a number of oars, presenting this "advantage that the apparatus is at times completely above "water, offering no hurtful resistance when the vessel is moving "under the influence of sails or otherwise."

[Printed, 4d. No Drawings.]

1860.

A.D. 1860, January 3.—N° 9. (* *)

JOHNSON, John Henry.—(*A communication from Nicholas François Urbin Desboissières.*)—This invention relates to the construction of boiler and other furnaces and fire-places producing perfect and economic combustion of fuel and consuming the smoke. The furnace is divided longitudinally into three, the two side divisions are fitted with fire-bars, but the central division is a fire-brick dead surface whereupon the fuel is introduced through a shallow cast metal box opening, which narrows inwards and extends the whole width of the furnace; the lower side forms a dead plate above the level of the furnace bars; lateral abutments for operating with the poker and rake are cast in the box, and a roller is fixed opposite the central opening upon which the shovel handle rests and rolls inwards at the time of feeding. The green fuel is deposited upon the dead surface, remains there during distillation, and becomes incandescent; it is then broken up and distributed on either side by the attendant, who again repeats the charge of green fuel in the dead surface.

The improvements are applicable to marine boilers.

[Printed, 1*s*. Drawings.]

A.D. 1860, January 13.—N° 98. (* *)

EUNSON, JOHN.—(*A communication from Robert Groat Eunson.*) —This invention is for cooling liquids. A refrigerating apparatus or "decalorator" is described as applied for the purpose of cooling the condensing water of marine engines; it consists of a long quadrangular casing internally flanged round within a short distance of each end, where small chambers are formed by tube plates fitted against the flanges; the chambers communicate with each other through an infinite number of small tubes fitted quincuncially into the tube plates; a series of transverse metal diaphragms perforated for the tubes to pass through, are disposed equidistant along the tube chamber and fixed alternately to opposite sides, leaving side channels for the passage of the cooling water, which is thereby made to course laterally between the tubes in each succeeding division.

The apparatus is fixed fore and aft to the side of the vessel below the water line, communicating by short tubular bends with the sea water, which, when the vessel is moving forward, enters the fore end of the tube chamber, and after coursing from side to side through each succeeding division, passes out again by the passage at the after end. These passages are closed by valves when necessary. The water from the hot well is raised into the other end chamber open to the tubes, through which it passes into the fore end chamber, and thence in a cooled state to the condenser. A conducting hood is so fixed outside the vessel over each passage that the sea water shall enter and leave freely. The decalorenser is applicable to all purposes for cooling liquids.

[Printed, 10d. Drawing.]

A.D. 1860, January 14.—Nº 105.

COFFEY, John Ambrose.—(*Provisional protection only.*)—
"Improvements applicable to or connected with steam engines
"and other motive mechanism, with the view to economize
"power."

The intention is to apply the power at as great a distance from the centre of motion as possible. For this purpose the inventor proposes to drive paddle wheels or a screw propellor by a toothed wheel equal or greater than the wheels in diameter, instead of a crank. Multiplying wheels, or "a system of large levers or large "cranks" may be used instead of a single toothed wheel.

[Printed, 4d. No Drawings.]

A.D. 1860, January 17.—Nº 120.

SPENCER, John Frederick.—"Improvements in steam
"engines for propelling ships and other vessels, and for other
"purposes."

The surface condenser for screw propeller engines is placed under the cylinders, and forms a support to the cylinder on the inner sides, while a chambered leg of it may form part of the condenser, which has its tubes placed in a direction across the vessel.

In direct action paddle wheel engines, the tubes are in a line with the keel. An improved slide valve is made by placing the chamber on the back of the slide which contains the supplementary slide for the cut-off apparatus, and then behind that the faced ring which works so as to lessen the steam pressure on the back of the slide.

[Printed, 1s. Drawing.]

A.D. 1860, January 19.—Nº 139.

NEEDHAM, Joseph.—"Improvements in the application of
"the rise and fall of the waves to the propulsion of vessels."

Apertures are made in a vessel's side above and below the water line, and the water which enters the upper apertures by the motion of the waves, is collected in reservoirs and allowed to flow into a water power engine by which paddle wheels or a screw propeller may be turned, and the water then escapes by valves in the lower apertures.

[Printed, 10*d.* Drawing.]

A.D. 1860, January 20.—N° 141.

GRIFFITH, William—(*Provisional protection only.*)—" Im-" provements in propelling vessels and locomotive carriages."

The vessel is propelled by the reciprocating action of a piston in a horizontal cylinder under water, which admits the water on each side of it by eduction valves, and expels it by an outlet always in the same direction.

[Printed, 4*d.* No Drawings.]

A.D. 1860, January 21.—N° 161.

BEVIS, Restel Ratsey. — (*Provisional protection only.*) — " Improvements in marine steam engines."

High and low pressure cylinders working the same shaft are so placed that the low-pressure piston may be at the end of its stroke about a sixth of a revolution before the other piston.

The engine can be started by admitting steam into the low pressure cylinder, and by a regulating valve the pressure of this is allowed to be only that usually employed for that cylinder.

[Printed, 4*d.* No Drawings.]

A.D. 1860, January 24.—N° 172. (* *)

GUFFROY, Charles Constant Joseph.—An invention for consuming smoke and feeding furnaces with fuel. Between the furnace bars a number of long narrow open troughs supported by hollow cross bearers are fixed, so that the bars, which are divided into groups, and the top edges of the troughs are level; the fore ends or mouths of the troughs expand and project forward beyond the furnace doors; the door plate has a small opening over the mouth of each trough, to which separate furnace doors are fitted; the troughs incline to shallowness towards their inner ends, and each is furnished with an "elevator," which is a long narrow metal plate corresponding with the length and width of the trough, rounded at the outer end to form a handle. When starting the furnace, the elevators are laid along the level bottoms of the troughs, which are then filled with fuel, and the process of distillation goes on before it is raised to the fire, which at the proper time is effected seriatim by the attendant, who first pushes an elevator to the shallow end of a trough, and then raises the handle to a level with the furnace bars, thereby lifting the feed; in this position the handle is suspended by a hook, while a charge of fresh fuel is thrown into the trough under the elevator, which is then withdrawn and thrust under the new charge along the bottom ready for the next lift. The apparatus is applicable to all kinds of furnaces and fire-grates, amongst others to marine furnaces. All clinkers are pushed over the bridge into a receptacle, which is daily emptied through a door opening at the end of the ash-pit.

[Printed, 1s. Drawings.]

A.D. 1860, January 24.—Nº 180.

HULME, WALTER, and HULME, THOMAS DAVENPORT.—(*Provisional protection only.*)—" Improvements in machinery or " apparatus for propelling ships and vessels on the water."

" This invention relates to the propelling of ships and vessels " on the water, whereby a greater speed is attained than hitherto, " together with economy of power and fuel. In the stern of a " ship, and on each side," " two or more square, cylindrical, or " oblong tubes " are arranged horizontally, " at the sides of " which are grooves for three or more guide rods to work in, the " centre one having flaps hinged in any suitable manner thereto, " the front being supplied with guards to retain the flaps in " position when pressing against the water, the back rod being " provided with small blocks or pieces to prevent the flaps " becoming quite closed when passing back through the water, " these flaps and cross rods are worked by means of piston rods " through stuffing boxes in connection with levers or other " suitable means, the object being to propel ships and vessels by " means of tubes and cylinders with flapped pistons working " therein. The mouths of the tubes being supplied with water-" tight sliding covers to keep out the water when necessary."

[*Printed, 4d.* No Drawings.]

A.D. 1860, January 26.—Nº 203.

MAURER, Jean Jacques.—"An improved propeller applicable "to various purposes."

Water is drawn in at the bows and expelled at the stern through tubes, so as to propel the vessel. The machinery for moving the water consists of cylinders and pistons with valves so arranged as to produce a continuous flow, and the particular action of the parts is explained by the drawings.

[Printed, 10*d*. Drawings.]

A.D. 1860, February 4.—Nº 297. (* *)

UREN, Edward Wills.—This invention of a rotary steam engine consists in driving a main axle by means of transverse slides acting in spaces formed within a series of cylinders placed end to end, concentric with the axis, upon which discs are fitted, which fill the central interior of each cylinder leaving an annular space around. About one-fourth of this annular steam space is filled up with solid packing, the form of which inclines at each end by tangent lines from the periphery of the disc to the internal diameter of the cylinder to which the packing is fixed. The transverse slides which pass through the axis are fitted at each end with "paddles" or plates alternately sliding into slots in the discs, and dividing the annular steam space, thereby forming an abutment for the steam; the diametrical length of the slides and plates through the axis, extends from the interior of the cylinder at one side, to the interior of the packing at the other. As the discs revolve and the outer edge of the plates come in contact with the inclines, they are driven into the slots in the discs, while the plates at the opposite end are projected from the discs into the steam space against the cylinder. Steam is constantly supplied at one end of the steam space, and after operating the slides as they alternately come round, is exhausted at the other end, passing into the second cylinder of the series, wherefrom, after driving round the slides, it passes into the third cylinder, and so on in progression to the last. "Occasionally" the remaining expansion force of the steam is employed in conjunction with the products of combustion, to operate a series of fans which are connected to and add their assistance to increase the power of the engine; these fans work in a series of cylinders. The steam cylinders are *placed either within* or outside the boiler, and may be disposed round a central cylinder of the same size, giving off power by means of coupled excentrics or otherwise. The engine is reversed by changing the steam supply to the opposite end of the series. Valves and stop-cocks for changing the direction and cutting off the steam are provided.

[Printed, 1*s*. Drawing.]

A.D. 1860, February 4.—N° 303.

INCHLEY, Joseph.—(*Provisional protection only.*)—" Improvements in propelling canal boats and other vessels."

Hinged floats on a rod under water are worked fore and aft so as to propel a vessel and to fold up for the return stroke. Steam engine valves are worked by an arrangement described as follows:—

"Two levers moving in a vertical plane are situated parallel to " the cylinder; the said levers turn upon one centre pin, the " longer and weighted arms of the levers being turned in opposite " directions; between the short arms of the said levers the lever " of the side valve is situated; a bolt sliding horizontally, and " worked by the piston rod of the engine, acts alternately on the " long arm of each lever in the following manner:—The said " bolt as it slides under the said arm first raises it, and then " acting on another bolt fixes the said arm in its raised position; " as the first named bolt retires and acts in the way described on " the other lever, it withdraws from under the fixed lever, and " when near the end of its stroke, withdraws the bolt which " held the lever up; the lever suddenly falls and its short arm " acts upon the lever of the slide valve. The levers being alter- " nately acted upon in this manner, the slide valves are worked " with precision at the end of each stroke of the piston."

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 4.—N° 306. (* *)

NEWTON, Alfred Vincent.—(*A communication from E. G. Allen.*)—This invention relates to combining within one case a pressure gauge, one or more vacuum gauges, a counter for registering the number of revolutions of the paddle wheel or screw shaft, and a clock for indicating true time. Hitherto these instruments have been placed at different parts of the engine room; this invention brings all together upon one face plate large enough to exhibit all the dials. The pressure gauge consists of a volute spring placed in two box couplings which fix the outer coil of the spring, whilst the central portions of the spring are left free; an india-rubber diaphragm is held between the two couplings, and covers the rear surface of the spring. The central coil is attached to a piston, which by means of a connecting rod and toothed sector arm, actuates a pinion upon the spindle which moves the indicator arm round the dial on the main face plate. The vacuum gauges are constructed on the same principle, the volute spring and diaphragms being reversed in position. The clock is of the ordinary make, placed in position within the apparatus so as to show time on a dial which is engraved on the main face plate. The counter for recording the revolutions of the paddle wheels or screw, is actuated by a series of discs representing respectively units, tenths, hundreds, thousands, &c.; each disc is divided into ten; one complete revolution of the unit disc moves the tenths disc one division, and one complete revolution of the tenths disc moves the hundredths disc one division, and so on; each revolution of the engine shaft moving the units disc one division, and thus the count goes on, the result being seen through a series of openings in the centre of the main face plate.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, February 8.—N° 333. (* *)

WAIN, William.—This invention relates to steam engines and superheating steam. 1. Compounding high and low pressure steam engine cylinders, whereby the steam having operated the high-pressure cylinder exhausts into the low-pressure cylinders where it works expansively, afterwards passing off to the condenser through a steam jacket which surrounds the low-pressure cylinder. An arrangement for a double pair of marine trunk engines is shewn; two low-pressure cylinders on one side the crank, pairing with two high-pressure cylinders on the opposite side, so that the connecting rods of each work side by side on the same crank throw. The centres of all the cylinders are placed on a plane with the centre of the crank shaft, each pair acting relatively thereon at an angle of 90°; the air pumps are placed by the side of the high-pressure cylinders sufficiently low for the pump rods, which are driven by the low-pressure pistons, to clear the crank shaft. The condenser extends the full width, and forms a box bed to each engine, upon which the crank bearings are mounted; the slide valves of each pair are arranged to be worked by excentrics with one rod answering for both valves; the usual reversing link motion is used. The invention is applicable to steam engines of other construction and arrangement.

2. Two cylindrical boilers with tubular furnaces similar to Cornish boilers, are placed side by side, partly forming a flue between them, to which a bottom and arched roof are formed by metal plates attached to the boiler sides; a large steam chamber tube reaching the whole length is placed along the centre of the flue; the steam on its passage from the boilers to the engines passes through the chamber, wherein it is intercepted and superheated by small transverse tubes placed at varying angles across the steam chamber, the whole surface of which is exposed to the hot draught from both boilers, receiving their products of combustion at one end and communicating with the chimney at the other.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1860, February 8.—N° 336.

MILLER, John.—(*Provisional protection only.*)—"Improvements in propelling vessels, ships, and boats."

Several tubes are placed below in a vessel, and one of them may form the vessel's keel. In a central tube are two pistons, and by the action of steam entering between these, and by other pistons in the other tubes, the water is drawn in and forced out to propel the vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 11.—N° 378. (* *)

HUMPHRYS, Edward.—This invention relates to a particular arrangement of vertical tubes within the uptake of marine steam boilers for the purpose of superheating steam. A marine tubular boiler with four furnaces separated by water spaces is shewn and described.

The mouths of the furnaces are ranged in a line across the lower part of the front of the boiler; they all open into a combustion chamber at the back, the burning gases returning through groups of fire tubes to a chamber in the front which extends the whole width of the boiler, gradually projecting forward over the furnace doors; above this chamber there is another separate chamber communicating with the chimney; the horizontal space between the two chambers is filled with a large number of short vertical fire tubes, which open into both chambers and form the uptake for the products of combustion. The steam in its passage out of the boiler is brought down from the highest level in the steam chamber, and enters at one end amongst the superheating tubes, coursing through them to the other end, where the steam outlet to the engine is situated. A modification suitable for ships of war is shown and described, in which the superheating tubes are placed on a level with the furnaces, the steam afterwards passing through a steam pipe within the steam space of the boiler.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1860, February 15.—N° 411.

MORRISON, Robert.—(*Provisional protection only.*)—"Improvements in marine steam engines and boilers."

Several boilers are arranged near or round one chimney, and the conical tubes in them are placed in various inclined directions described at length.

A water gauge is so arranged that the glass will shew the level at a height of about 5 feet from the floor. This is done by having a float inside the boiler connected to a bent rod, the end of which rises in a tubular space fastened to the outer shell of the boiler, with glass through which the turned up point of the rod may be seen.

A surface condenser of flat plates and spaces is so arranged that the water space and the steam space may be accessible for cleaning without removing the condensing apparatus.

Several arrangements are described for the combined use of engines with several cylinders on the same shaft.

[Printed, 4*d.* No Drawings.]

A.D. 1860, February 15.—N° 418.

HAMILTON, John, and SILVER, Thomas.—"Improvements in marine steam engines."

The object of the invention is to cause the governor apparatus to act with more energy and promptitude in regulating the speed of an engine under sudden variations of work.

For this purpose the steam pipe, the exhaust pipe, and the injection pipe have each a "bulged" portion, in which a throttle valve acts, so that by a very small movement of it when closed, there will be room for a free passage.

One or more of these valves is acted upon by the governor, and the speed of the piston is regulated by a back pressure, which may be in conjunction with a diminished supply of steam or of injection water.

[Printed, 10d. Drawing.]

A.D. 1860, February 23.—N° 495.

REDFERN, JOHN.—"Improvements in the construction of "steam boilers for increasing the durability thereof, and also for "economizing fuel."

"Instead of allowing the heat from the fire-box to pass direct "through the tubes, as, for example, ordinarily practised in the "boilers of marine engines," it is proposed "to make the fire-box "in two or more separate parts, and to have as many fire-boxes "in one boiler as may be required, extending the whole depth or "length of the boiler. Over the crown of each fire-box is a thin "water-space, the upper side of which is a flue or flues, along "which the heat from the fire passes, entering said flue or flues "at the back end of the fire-box or back end of the boiler, the "heat again passing by a cross flue at the front of the boiler, "and entering the tubes thereof passes along them. The flues "are intended to be entirely surrounded by water. By thus con"structing multitubular boilers, the fire is brought more directly "into contact with the entire body of the water in the boiler than "in multitubular boilers as heretofore constructed, and conse"quently by these improvements a saving of fuel is effected, and "by thus uniformly distributing the heat through the boiler and "causing it to travel three times the length thereof, the tubes "and back tube plate of the boiler are not liable to be burnt at "those parts where incrustation has taken place."

Reference is made to this Specification in No. 1243, A.D. 1863.

[Printed, 1s. 2d. Drawings.]

A.D. 1860, February 29.—N° 558.

RANKEN, GEORGE.—"Improvements in paddle wheels."

Each of the paddle floats has a flange on its two side edges, and on its inner edge, and it may turn through a small angle and yield when striking the water, until a stop fastens it in the position for the rest of its active course.

[Printed, 8*d.* Drawing.]

A.D. 1860, March 3.—N° 590.

BAUER, WILLIAM.—"Improvements in apparatus for diving, " and for raising and lowering bodies in water, parts of which " improvements are also applicable to other useful purposes."

The specification describes a diving machine and apparatus connected therewith. The only portion of the invention relating to this series consists in the application to the machine of a screw propeller worked by hand to drive it forward, and another smaller screw propeller to cause it to turn round. Another part of the specification describes a method of raising wrecks, etc. by means of air balloons.

[Printed, 2*s.* Drawings.]

A.D. 1860, March 3.—N° 594.

SCHIELE, CHRISTIAN.—"Improvements in obtaining and " applying motive power from ocean or other waves."

The "invention relates to certain mechanical arrangements for " taking up the power exerted by the waves of the ocean." " Oblique surfaces or boards, buoys, floats, pistons working in " cylinders, and boards on hinges" are opposed to the action of the waves, "in such a manner that the waves' motion shall " impart a horizontal reciprocating motion, a direct horizontal, a " vertical, a rotatory, a surgin, or other motion." Power thus obtained is accumulated and used for various purposes.

"The oblique surfaces or boards" are used for towing ships. To a hollow floating beam are hinged "a number of oblique " surfaces like wings" which are moved up and down by the waves "and thus acting as inclined planes give a propelling " motion to the hollow beam." Towing cables are led from the beam to a ship. By using two cables the beam may be steered. These wings may be "exposed to the action of waves produced " by steam vessels," when they "will take part of their power " up, and also lessen their damaging effect on the shore of canals " or rivers."

[Printed, 10*d.* Drawing.]

A.D. 1860, March 3.—N° 595.

HUMPHREYS, EDWARD.—"Improvements in marine boiler "furnaces, and in feeding the same."

The "invention consists in the employment of marine steam "boilers of such a size as will permit of their being fed "mechanically in combination with machinery for creating an "artificial draught through the furnaces, and for supplying such "furnaces with fuel." The furnaces are about two feet by six. Over the furnace is a horizontal revolving cylinder, which extends over the whole length of the fire, and is divided into several compartments for fuel. The fuel is fed in from a hopper. A shoot leads from the cylinder to the fire. An exhausting fan is placed in the smoke box, or a fan before the fire drives in air. The furnace bars are "simple bars of iron, which may be slidden "in through the front of the furnace, and made to rest at back "upon a flange."

[Printed, 10*d*. Drawing.]

A.D. 1860, March 8.—N° 630.

BARTON, MOSES, SHEPHERD, JOSIAH, and EVANS, THOMAS.—(*Provisional protection only.*)—"Improvements in the "method of and apparatus for supplying and heating air, the "same to be used as a motive power for marine, locomotive, and "stationary engines."

A strong iron vessel is used, termed an "air furnace," and made in the same way as steam engine boilers. Into this air is forced by the following process:—To inlet valves at the bottom of the "air furnace" small cylinders furnished with pistons are attached. Valves at the bottom of each cylinder admit the "partially heated waste air" from the engine, or the atmospheric air from the cylinders. It is forced "in alternate rapid succession "into the air furnace by the gravitating force of a suitable "number of balls, which balls (as they fall in succession, their "concussive force) knocks down the piston on which they fall, "thereby forcing the air beneath them into the air furnace." The balls are, after falling, elevated by screws. The "air furnace" is heated either externally or internally, or both. The air is supplied to the engine in the same way as steam.

The object of the invention is stated to be a saving of fuel, and it is said to be peculiarly adapted for marine engines.

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 14.—N° 680.

HORTON, Isaac, and KENDRICK, Isaiah.—"Improvements "in steam boilers."

The invention "consists in combining one or more fire-box "boilers with one, two, or more boilers with vertical fire tubes or "vertical water tubes, the latter boiler, or last in the series of "the vertical tube boilers, having a smoke box, in which, as well "as in the uptake or base of the chimney or funnel, a tubular "chamber is placed. This chamber is intended for the reception "of the steam generated in all or any of the separate boilers, and "for the drying or superheating thereof, the products of combustion passing through the tubes in the chamber on their "passage to the funnel."

The patentee also describes a "Marine High-pressure Back "Smoke-box Generator," which may be used in connection with his other apparatus. It consists of two horizontal cylinders connected by vertical water tubes, amongst which the flame and products of combustion play.

[Printed, 2s. 8d. Drawings.]

A.D. 1860, March 17.—N° 710. (* *)

BROTHERHOOD, Peter.—"An improved method of generating steam in locomotive, stationary, marine, or any other "form of steam boiler."

The invention consists in taking a portion of steam from the boiler and passing it through a superheating apparatus by means of a pump or other suitable forcing apparatus connected with a smoke box or with a furnace. In its passage through the superheating apparatus the steam will be raised to a high degree of temperature, in which state it is to be returned into the boiler through a perforated pipe or pipes, arranged and disposed at the lowest part of the boiler.

[Printed, 4d. No Drawings.]

A.D. 1860, March 21.—N° 732. (* *)

SYKES, Thomas, SYKES, Benjamin Clifford, and CROSSLEY, James William.—This invention relates to heating water, air, and other fluids, generating and superheating steam, preventing incrustation in steam boilers, and consuming smoke. It consists—

1. In casting metal upon wrought iron or other metal tubing bent in a spiral or other form, whereby continuous water channels within the solid metal of thick cylindrical shells, or in flat or curved plates, are formed, portions of tubing being left projecting for the purposes of attachment; also fitting one metal cylinder within another, upon which a spiral groove has been cut, and fastening the two together for the same purpose; also connecting flat or curved plates face to face, whereon serpentine or zig-zag passages have been formed; both sides of these cylinders or plates are subjected to the action of fire, whereby the fluids in the channels become quickly heated, and a circulation thereof maintained. The water or steam is discharged into a vertical egg-shaped vessel by a suitably formed pipe within another pipe wherein the steam is superheated and conveyed to the engine. The dirt deposited at the lower part of the vessel is blown off through a tap and pipe fixed thereto. The feed water is heated by coiling and passing the pipe through the lower section of the vessel. 2. Using such channelled cylinders and plates as auxiliaries to Cornish and other boilers, by placing them in the flues so as to expose both surfaces to the action of the fire-draughts. 3. Constructing upon a horizontal cylindrical boiler a steam chamber, and to the under side a dirt chamber, wherein the feed pipe is spirally coiled; the body of the boiler is filled with fire flues attached to a water space at one end of the boiler, and so connected as to form a continuous passage for the fire draughts; water pipes run through the fire flues open to the feed and the body of the boiler. Concentric cylinders or plates in connection with the feed may be placed in the fire flues. 4. Constructing boilers with concentric tubes; the central is a fire tube, the annular space within the surrounding tube is the water space, which is externally and internally exposed to the fire draught. 5. Constructing furnaces or fire-boxes in two compartments by means of a midfeather, so that each part shall be separately employed, the [illegible] division in coking the green coal, while the [illegible] effects the combustion of the gases and smoke evolved [illegible]. The fire-bars, which are placed across the furnace, are hollow and open at one end, where the cold air enters and passes through slits in their slides beneath the combustion division. The invention is applicable to marine engines.

[illegible] Drawings.]

A.D. 1860, March 22.—N° 744. (* *)

BELL, Robert, Administrator of John Smith Bell.—This invention relates to steam engines and boilers. A high-pressure cylinder is placed concentric within a low-pressure cylinder; the high-pressure piston is of the ordinary construction and actuates a connecting rod coupled to the central throw of a three throw crank shaft; the piston of the low-pressure cylinder is annular, with two piston rods disposed in a line with the centre. Their two connecting rods are coupled to the outer throws of the crank which are opposite to the central throw, the whole three being in a plane with the centre of the crank shaft; or to prevent dwelling on dead centres, the central throw may be 2° in advance of the outer ones, the effect being that the low-pressure piston is turning the top centre while the high-pressure is within 2° of turning the bottom centre, the one ascending while the other is descending, and vice versâ, thereby confining the strain to the engine by counter-action. Only one slide valve is employed to each pair of high and low pressure cylinders, viz., for admitting steam to the high-pressure piston, transmitting it to the low-pressure piston, and conducting it to the condenser. Expansion slides are fitted to the main slide valve. It is proposed to pass part of the injection water of the condenser through a refrigerator of the ordinary construction, to be returned and re-employed for condensing, the other part being pumped into the boiler. The boilers are constructed for marine purposes, the backs, tops, and fronts being hemispherical or curved. Above the water space which covers the furnace there is a chamber filled with vertical water tubes, which form a water communication with the upper part of the boiler; the flaming gases after passing from the two furnaces to the back of the boiler, return through the chamber amongst the vertical water tubes, and thence through a series of vertical fire tubes arranged within the steam space; the tube plate and lower ends of the tubes are below the water level; the upper ends of the tubes superheat the steam and open to the chimney.

[Printed, 10*d*. Drawing.]

A.D. 1860, March 26.—N° 778.

MAXWELL, Joseph Alexander.—"Improvements in hydraulic engines to act either alone or in combination with steam and steam engines."

The invention relates to hydraulic engines working on the "turbine or Barker's mill" principle. One jet or outlet arm is used in connection with the column of water furnishing the motive power, and the water passes "from the influence of the "revolving machine" to "a circular trough or tube of much "larger capacity, and capable of containing the full vertical "column of water to run down the incline, than the jet of the "radiating arm of the machine, being as it were a combination "of the jet pipe in a circular direction round the centre of "motion; this circular channel is inclined, and being a complete "circle terminates immediately under the jet aperture when "the water escapes from it." This action is "attended with "beneficial results in the working of the machine." The machine may be worked alone or in combination with a steam engine. In the latter case the circular channel may act as the fly wheel. A vacuum may be formed by the use of a steam engine to raise the water again for use in the hydraulic engine.

[Printed, 10d. Drawing.]

A.D. 1860, March 29.—N° 817. (* *)

HAMILTON, John, junior.—This invention has for its object improvements in constructing and propelling vessels. "For these "purposes in order to use paddle wheels at the ends of vessels "more advantageously than heretofore, each vessel is constructed "double at the end where the paddle wheel is to come, and the "two parts are at such a distance apart as to admit of a paddle "wheel between them, the bearings for the shaft of the paddle "wheel being carried by the two parts of which the vessel is "constructed. The upper parts of these two structures are "decked over, and a paddle box rises from such deck and passes "over the paddle wheel, leaving a space on the deck to admit of "passing on either side, and the deck extends beyond the paddle "wheel so that there is a free passage all round. The rudder is "placed beyond the paddle wheel, and its axis is supported in a "suitable bearing or bearings on deck, no stern post being used. "The body of the vessel where it joins the two parts of the "body which come at the two ends of the paddle wheels" is "curved or inclined so as to make a suitable form for the reception of the paddle wheel."

[Printed, 8d. Drawing.]

A.D. 1860, April 4.—N° 862. (* *)

PULLAN, Abraham, and CRESSWELL, Thomas.—Gauges applicable to steam boilers, for indicating the water level and steam pressure. These gauges have a peculiar arrangement of steam and water chambers, and passages commanded by a "three "way cock;" the water chamber has a polished reflector at back, and a glass front, through which the height of the water is seen when admitted upwards from the boiler through a central passage in the cock, which also at the same time opens a steam way to admit steam to the upper part of the chamber, into which the bulb of a thermometer descends, for the purpose of ascertaining on the scale above the temperature, and consequently the pressure, of steam. The third way in the cock opens a passage to empty the gauge. A steam whistle to signalise shortness of water is attached to the gauge. To test the condition of the water in marine boilers, it is admitted in a boiling state to a box to surround the bulb of a thermometer, which will show the temperature of the water, and at the same time indicate the strength of the saline contents. The gauge passages are cleaned by a spindle. Many modifications are shown and explained.

[Printed, 1*s*. Drawing.]

A.D. 1860, April 21.—N° 1000. (* *)

BUTLIN, William.—This invention relates to superheating steam and heating feed water; it is applicable to tubular marine boilers and to the boilers of locomotive and portable engines. It consists in placing a narrow heating tube chamber within the smoke box across the tube plate, so that the mouths of the tubes in the chamber shall coincide and form an exact continuation of the fire tubes of the boiler. "If intended for superheating steam, "the upper part of this chamber is placed in communication by "means of a pipe on one side with the steam space in the boiler, "and on the other side with a pipe, through which the super-"heated steam is conveyed to the cylinders of the steam engine." Saturated steam can be admitted into the passage pipe of the superheated steam when required, by means of a screw valve mounted thereon. When the tube chamber in the smoke box is used to heat feed water, it is made to enter from the pumps at one end, and after passing amongst the tubes it discharges at the other end through a pipe in communication with the lower regions of the boiler. Instead of one heating tube chamber the use of two or more may be found more convenient.

[Printed, 8*d.* Drawing.]

A.D. 1860, April 21.—N° 1001.

MACNAB, William.—" Improvements in and connected with " marine and other steam engines."

"The first part of the invention relates to a design for the " arrangement of the parts of marine engines of the oscillating " class."

" In this design the oscillating cylinders and various other " parts are placed within a rectangular base or space, the surface " condenser being placed at one side of this base. The cylinders " occupy the opposite ends of the rectangular space, having " between them the air pumps and the pumps for forcing the " condensing sea water through the condenser. The base plate " or casting occupying the floor of the rectangular space is " formed with seats for the pumps, and passages to and from " them, also with the usual bearings for the cylinder trunnions, " both cylinders exhausting through their inside trunnions or " bearings into a single passage leading down with a bend to " the condenser. The parts are so arranged that the surface " condenser can be converted into an ordinary condenser, or be " removed and an ordinary one substituted.

"The air and sea water current pumps may be worked in " various ways, but it is preferred to employ eccentrics placed " on the intermediate shaft, and connected to levers or beams " which communicate the motion to the pump rods. The pumps " may be double-acting or single-acting as preferred, and their " number may also be varied. The condenser may also be " constructed with the tubes arranged either in a horizontal or " vertical position, and the sea or condensing water may be made " to pass through or inside of these tubes by means of pumps or " other suitable apparatus, being made to flow alternately in " opposite directions by means of partitions. The currents also " from the pumps may be kept separate, and made to cross " each other by a suitable arrangement of the passages and " partitions."

In the second part the tubes in the surface condenser are fixed in sets with their ends in small frames which fit into the ends of the condenser, being so packed that they may have liberty to contract and expand under the variations of temperature.

The third part provides for the use of an auxiliary boiler wherein steam is produced from sea water at a low pressure, and then superheated and passed round the jackets of the cylinders and valve casings still at a low pressure, until having imparted its heat to these surfaces the steam is condensed for a supply of fresh water.

[Printed, 10*d.* Drawing.]

A.D. 1860, April 26.—N° 1049. (* *)

WRIGHT, James.—(*A communication from Horace Gray.*)—(*Provisional protection only.*)—This invention relates to the prevention of incrustation in steam boilers using sea, calcarious, or other impure water. A separate vessel is used, called a " separator," "placed either within or in communication with " the boiler, so that it can be heated by the steam from the " boiler, and consequently kept at the same temperature as the " latter, which," " should be about 300° Fah. The feed water is " pumped into this separator, and is thus heated by the steam " from the boiler (not by the direct impinging heat of fire) until " raised to the before mentioned temperature, when the deposits " are rendered insoluble, and falling to the bottom may be driven " off by the blow-off cocks in the usual manner, as they do not " adhere but form a loose sediment. The purified water rising " over the side of the separator falls into the boiler, giving it a " continuous supply."

[Printed, 4*d.* No Drawings.]

A.D. 1860, April 30.—N° 1088. (* *)

BOUSFIELD, George Tomlinson.—(*A communication from Edward N. Dickerson.*)—This invention effects without concussion or injury the rapid closing of the independent cut-off valves of marine engines at any point of the stroke. Mounted upon the valve case of a single poppet valve is a socket in which a vertical plunger attached by a lateral arm to the valve rod works up and down parallel therewith; the lower end of the plunger is hemispherical, and the bottom of the socket (which contains some liquid) is formed to receive it; a cam upon the main shaft acting upon a bowl at the end of a fixed lever, by means of a connecting rod and a bell-crank lever, lifts a catch rod twice every revolution. A projecting catch is formed at the top of the valve rod facing downwards, which when the valve is about to lift, is operated by a similar catch facing upward at the lower end of the catch rod, and an escapement is effected by means of a roller fitted in the end of an adjusting lever arm coming in contact with a projecting incline on the side of the catch rod. The plunger having to displace the liquid in the socket, prevents any bruising of the seating or surfaces when the valve falls. The position of the adjusting lever can be set to drop the valve and cut-off at any part of the stroke.

[Printed, 6*d*. Drawing.]

A.D. 1860, May 2.—N° 1109.

SILVER, THOMAS. — (*Letters Patent void for want of Final Specification.*)—" Improvements in the machinery for and method " of driving or communicating motion to a ship's propeller."

In driving a screw propeller shaft the cylinders are placed with their axes in the direction of the keel, and thus turn a shaft across this direction, which by mitre wheels turns the propeller shaft.

When two propellers are used one aft of the other, the shaft of this latter passes through the hollow shaft of the former. The thrust of the shaft may be screwed upon the edges of discs turning on the transverse shaft worked by the engine, so that the main shaft is turned partly or wholly by the friction thus brought into play.

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 3.—N° 1111.

BRICKHILL, JAMES, and NOBLE, JAMES.—" Improvements " in screw propellers."

The blades of a screw propeller turn on their axes in the boss, and are geared therein with a shaft having a bevelled wheel on it, by which it may be worked from the deck so as to set the blades to a desired angle.

[Printed, 10*d*. Drawing.]

A.D. 1860, May 3.—N° 1114.

HENRY, MICHAEL.—(*A communication from Louis Coignard.*)— " Improvements in the mode of and apparatus for propelling, " turning, and changing the direction of ships, balloons, and " other bodies."

Water is forced into tubes on board a vessel so as to exert a pressure on all sides, and the direction of the open ends of the tubes is capable of being regulated so as to steer as well as to propel the vessel. Various forms and curves of tubes are depicted in the drawings.

The invention is applicable also to balloons.

[Printed, 8*d.* Drawing.]

A.D. 1860, May 10.—N° 1155.

BOYMAN, RICHARD BOYMAN.—"Improvements in applying "steam or other expansive prime movers by action and reaction "for rotary motion and propulsion, and in the machinery for the "purpose."

The invention describes modes of using the force generated by the reaction of steam allowed to issue intermittently at high pressure, and regulated by valves and cranks worked by donkey engines.

More than 50 pages of the specification are occupied chiefly by arithmetical and algebraic calculations with drawings illustrating the subject.

[Printed, 3*s.* 4*d.* Drawings.]

A.D. 1860, May 11.—N° 1159.

DOERING, FREDERICK BERNHARD.—(*Provisional protection only.*)—"Apparatus for governing and regulating the speed of "marine engines."

Tubes allow the water near the vessel's stem to act upon a piston and spiral spring, so that the depth of the immersion of the propeller regulates the throttle valve.

[Printed, 4*d.* No Drawings.]

A.D. 1860, May 14.—N° 1183.

MUNTZ, WILLIAM HENRY, and KING, HENRY.—"Improve- "ments in marine steam engines, part of which is applicable also "to ships' pumps."

The cross head of the piston rod works on vertical guide rods bolted to the cylinder cover, and these also support the framework of the shaft. The side rods at the ends of the cross head are connected to one end of a half beam, which vibrates on a fixed fulcrum at its other end. The connecting rods are attached to this half beam at a point between the side rods and the fulcrum. The piston stroke is thus longer than the diameter of the circle described by the crank. The air pump rods are attached nearer the fulcrum to the same lever. The foot valve and air pump buckets are of perforated pieces of metal covered with india-rubber. A bell-crank lever may be interposed between the lever above-mentioned and the crank. The bearings of the paddle shaft may be moveable. The upper frame which carries the shaft may be made of "iron or steel plates set on edge."

[Printed, 3d. Drawing.]

A.D. 1860, May 16.—Nº 1212.

SIMPSON, Cortland Herbert.—(*Provisional protection only.*)—"Improvements in propelling vessels through the water "and apparatus connected therewith."

The propulsion is effected "by means of pistons or plungers "working in two cylinders placed horizontally on each side in "the rear of the vessel, and as near her bottom as possible. "Then free ingress & egress being given to the water at the after "ends of the cylinders, the vessel will be propelled by the "alternate action of the pistons upon the water in their passage "by the agency of steam from the inner to the outer extremes "of the cylinders, these pistons being also the steam pistons, "and each piston having an inner cylinder attached to it, fitting "steam-tight within the main cylinder, and also fitted to work "steam-tight through the cover of the main cylinder, the steam "being admitted into this inner cylinder through the main "cylinder cover, and the vacuum being formed by the ordinary "condensing apparatus. The object sought to be attained by "the above plan of having a second or inner cylinder, may also "in some respects be more advantageously attained by doubling "the length of the main cylinder, and fitting it with two pistons "on the same piston rod, and separated by a space equal to the "length of the stroke; in this case the steam will be admitted "and vacuum formedbetween the cylinder cover and the piston "nearest to it, the air being allowed to remain between the two "pistons, both of which are fitted to work steam-tight & water-"tight in their cylinder, and the after piston will act upon the "water to propel the vessel."

[Printed, 4d. No Drawings.]

A.D. 1860, May 31.—Nº 1338. (* *)

FLETCHER, Lavington Evans.—(*Provisional protection only.*)—This invention relates to the construction of vertical steam boilers and the use of centrifugal pumps for promoting an artificial circulation of water; the use of an artificial blast; placing rods or tubes within the fire tubes to form annular passages for the fire-draught, superheating steam and afterwards tempering it by a limited admission of saturated steam or water, constructing surface condensers with a series of groups of tubes bent to the form of a horse-shoe. In the arrangement of engines for driving screw propellers, placing the surface condenser above the crank shaft, and fixing an annular cylinder on each side of the condenser, the connecting rods acting upon one crank at relative angles of 90°. Driving the air and other pumps by the other ends of the piston rods which work through the bottoms of the cylinders. "In applying a surface condenser to screw engines already built, of the "inverted cylinder or overhead engine class, I place the surface "condenser above the hot well, and fix the air pump on one side "of the condenser, and the cold bath water pump on the other "side of the condenser. I drive the air pump and cold bath "water pump by the same levers that are at present commonly "used in this class of engine for driving the ordinary air pumps. "I leave the ordinary air pumps, hot well, and injection condenser "intact." The inventor refers to the specification of a patent granted to him March 18th, 1858, No. 550.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 7.—N° 1396. (* *)

MILLER, Thomas William.—This invention relates to steam boilers. The boiler shell is a double casing forming a narrow outside water space; the interior is divided between the furnaces by double vertical partitions forming thin water spaces in communication with the outer case; attached to the side or sides of each furnace a short distance above the fire, is a series of bent, curved, or straight water tubes which rise respectively through the crown of each furnace with open ends into the steam chamber considerably above the water line, their upper ends being held in position by a division plate; the flaming gases play amongst these water tubes, which present a very considerable heating surface, and then rise at the end of the boiler to the uptake, which is separated from the steam chamber by a single plate, the back and end being formed by the water space of the outer casing.

Reference is made to modifications and additions to boilers for which Letters Patent were granted to the inventor, bearing date

May 3rd, 1859, No. 1106. They consist in arrangements as therein described for the purpose of passing the burning gases from one furnace to another, thereby effecting more perfect combustion. Horizontal connecting steam tubes are introduced between the water spaces immediately over the furnace, the generating tubes are vertically placed and the products of combustion collected at the end of the series of furnaces, which before entering the uptake are brought into contact with the connecting steam tubes.

The steam chamber is divided within the boiler into two parts, which communicate with each other through a series of vertical tubes or sheet spaces, around and between which the products of combustion are made to pass on their way to the chimney.

[Printed, 2*s*. 4*d*. Drawings.]

A.D. 1860, June 7.—N° 1399.

KINGSLEY, Jeffries.—(*Provisional protection only*.)—"Improvements in testing screw propellers and paddle wheels."

A model of the propeller to be attested is to be turned by clockwork, and the effect produced to be estimated by a thrust or by a weight raised in air, or a model vessel moved through the water or a carriage moved on rails. A balloon may be used to counterbalance the weight of the apparatus during the experiment.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 9.—N° 1424. (* *)

ROMAINE, Robert.—This invention for steam boilers and surface condensers, relates, first, to the construction of boilers by surrounding and forming their ash-pits, furnaces, internal chambers, and flues, by a continuous coil of pipe through which the water is made to circulate, by means of a spiral pump, from the feed pipe in the front below the bottom of the ash-pit, until it is delivered into the upper part of a vertical cylindrical water chamber at the back of the apparatus, the upper part of which forms the steam chamber above the water level. The chamber is connected with the delivery of the force pump by a pipe at its lower end, which also communicates with the spiral circulating pump in front. The vertical chamber terminates in a descending tube fitted with a cock for blowing off muddy deposits. Within the chamber, around a central supplying water tube, there is a circular group of fire tubes, up which the products of combustion, after leaving the body of the apparatus, pass into the chimney flue. Each succeeding turn in the coil is fitted in close contact with the preceding one, leaving no space between, and the whole is encased by a non-heat-conducting material. According to the modifications shown, the form of the apparatus is changed to suit its various applications; for marine purposes the furnaces and internal chamber are narrow and deep. A compound series of four are shown at each end of a steam generator wherein there are four vertical water chambers centrally placed so that one water chamber receives the hot draughts from two furnaces. Baffling plates are used to detain the burning gases within the apparatus, and separate pipes not in contact, spirally coiling round a central bend whereon the furnace is placed, form part of the invention.

The surface condenser is a closed chamber divided near the bottom by a horizontal tube plate; the lower division is sub-divided by a central vertical partition; each sub-division communicates with separate ends of the tubes, which rise from the tube plate in rows in the form of tall arches, one pipe arched outside another and so on, forming flat transverse sections in the chamber. To throw the steam against its surface, the end of each tube is fitted with a central tube with downward tapering end, which leaves an annular passage for the steam. The engine exhausts into one of the lower divisions above the surface of the water maintained at a common level in both, communicating through holes near the bottom of the partition; the steam makes a circuit within the tubes from one division to the other, to which the air pump is attached. Pipes are provided for drawing off the heated water from the tube compartment, and for injecting and distributing the cold water therein.

[Printed, *2s. 2d.* Drawings.]

A.D. 1860, June 11.—N° 1429. (* *)

JOHNSON, JOHN HENRY—(*A communication from Narcisse Duvoir.*)—(*Provisional protection only.*)—This invention relates to a centrifugal governor, and to the disposition and mode of working the throttle valves of steam engines. The governor " consists of a metal ring, carried by a spindle, passing diame-" trically through it, and transversely through a hollow shaft, " which rotates in suitable bearings either in a horizontal, " vertical, or inclined position. Within this hollow shaft works " a rod or bar, having a sufficiently large opening made in it to

" admit of a toothed segment fast on the spindle of the ring " gearing into a rack formed on the inner surface of the opening " above referred to in the internal rod or bar. A helical spring " adjustable by means of a screw and thumb nut, is attached to " one end of the rod or bar, by which means the governor can " be made more or less sensitive. When at rest or when the " tubular shaft, which may be driven by a band or pulley or by " gearing, is rotating slowly, the ring lies nearly flat against the " opposite sides of the shaft, being retained in this position by " the tension of the helical spring above referred to; but as the " speed increases, the ring gradually assumes a more vertical " position until at the highest speed it attains a position at right " angles to the shaft; this movement of the ring on its transverse " axis turns more or less the toothed segment which causes the " internal rod to slide longitudinally within the tubular shaft, " and this motion is transmitted in any convenient manner to " the throttle valve so as to open and close the same." The loss of steam by condensation between the throttle valve and the cylinder is reduced by placing the throttle valve as close as possible to the steam chest or inserting it in the back of the slide valve.

[Printed, 4*d.* No Drawings.]

A.D. 1860, June 11.—N° 1430. (* *)

SALMON, PETER.—This invention relates,—

1st. To a self-acting arrangement for regulating the admission of air to furnaces. A cylindrical single-action air pump is attached to the furnace door; the piston rod is furnished with a cross-head, to which slides perforated to coincide with a double row of openings through the furnace door are suspended; the piston draws and delivers at the bottom of the cylinder. When the door is opened, a lever which raises the piston rod, is operated by coming in contact with a spiral incline round the hinge pin; when the furnace door is closed, the piston rests on the air within the cylinder, which is gradually forced out through a regulating cock by the pressure of the piston, aided by the weight of the piston rod, cross-head, and slides; when the piston is raised, the air passages through the door are fully opened, and they are gradually closed by the slides descending, the speed of the operation being controlled by the extent to which the regulating cock is opened. Air out of the ashpit is admitted into a chamber at the furnace bridge, through a valve by means of a lever operated by the opening of the door.

2nd. The use of furnace bars in the form of an inverted trough wherein, for the passage of air, a narrow slot extends through a considerable portion of their length.

3rd. Supplying boilers by means of force pumps, with air saturated with steam, and heated in its passage through the feed pipes, which are coiled or otherwise within the uptake in the boiler, smoke chamber, fire-box, or flues; the steam is thus superheated, and being mixed with the air, prevents the intense heat from damaging the pipes. "Only a sufficient quantity of "water is forced into the boiler to protect it from injury from the "fires, flues, or tubes through a plate or plates, pipe or pipes, "perforated with small holes, which water is also heated in the "manner above described."

[Printed, 10*d*. Drawing.]

A.D. 1860, June 20.—N° 1497.

HIRON, HENRY FRANKLIN, and FELL, RICHARD.—"An im-"proved vertical paddle wheel."

Each paddle float turns on a horizontal axis in the frames, and is caused to maintain a vertical position by the action of an arm on a wheel placed excentric to the paddle wheel.

[Printed, 10*d*. Drawing.]

A.D. 1860, June 21.—N° 1511. (* *)

STEVENSON, HENRY BUENAVENTURA.—(*Provisional protection only.*)—"Improvements in apparatus for propelling, and in "other rotary apparatuses."

Two wheels are employed "at a suitable distance apart, and "arranged so that they may revolve together, their planes of "revolution being parallel to each other, but the wheels are "excentric to one another." "These wheels carry between "them plates, boards, vanes, frames, buckets, or vessels' sails." Each of these "plates, appliances, or instruments is held to "or carried by both wheels at points which are on each wheel "equidistant from the centre of that wheel, and at the same "distance from each other in one wheel as in the other, those "of the first wheel being the same distance from the centre "of that wheel as those of the second wheel from the centre of "*that second wheel.*" "Water, steam, or other motive agent

" may act on the plates, sails, or other instruments or appliances, " and impart motion to the wheels to be transmitted therefrom " in any suitable manner for various useful purposes."

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 22.—N° 1516.

PALMER, Henry, and SWIFT, Henry Spink.—" Improvements in the method of and apparatus for propelling ships, " vessels, boats, or other craft in, on, or through the water."

A plunger or piston moving fore and aft in a tube open at both ends, and fixed to a vessel under the water line, drives water through tubes alongside or enclosing it, in such manner that its egress is always in one direction to propel the vessel. This direction may be altered so as to steer the vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 27.—N° 1557.

MACNAB, William.—" Improvements in and connected with " marine and other steam engines."

The first part of the invention relates to a design or mode of placing the parts of an inverted cylinder engine, including the surface condenser, air pumps, and current pumps.

The surface condenser is rectangular, and has " horizontal " tubes arranged transversely in sections." It is placed between and close to the cylinders. There are two air pumps and two current pumps, one of each on each side of the condenser. They are single-acting. Their buckets have trunks and act vertically. The steam exhaust passages enter the condenser at the top, and the water flows by troughs in the bottom. The air-pump bucket does not rise to the top of the barrel, so that a little water is always retained in it to keep it air-tight. Each current pump is outside the air-pump, and receives the sea-water by a valve at the side. " Communication may be made to the condenser from the " donkey engine," so that the condenser may be worked independently of the main engines.

By the second part of the invention the tubes of surface condensers are secured by elastic rings and ferrules, and with washers and intermediate screws, so as to allow longitudinal play caused by various temperatures.

[Printed, 1*s*. Drawings.]

A.D. 1860, July 11.—N° 1670. (* *)

DAVIES, George.—(*A communication from Messieurs Gargan & Co.*)—This invention relates to supplying water to steam boilers. The apparatus consists of a fixed vertical cylinder open at both ends, wherein a long piston actuated by mechanical means continuously works up and down; one opening towards the top of the cylinder communicates by a pipe with the boiler at the water level, and a second with the bottom of the boiler; a third opening at the opposite side of the piston, communicates by a pipe with the supply cistern, which is somewhat above the boiler; in the centre of the piston there is a long chamber which is opened to the supply cistern when the piston is at the top, and to the boiler through the upper and lower openings when the piston is at the bottom of its action. The central chamber having been filled with feed water, the piston descends and opens the two communications with the boiler; if the water is up to its working level, there will be no outflow, but if it is below it, then the steam will enter the piston chamber at the upper opening, and drive the water through the lower communication into the boiler. The cylinder and piston may be placed in a horizontal position. One modification of the invention is shown, which consists of a revolving hollow plug in a socket, opening and closing communications with the boiler and supply cistern. Another modification shows a hollow triangular slide within a suitably formed case, acting on the same principle. Another modification of the principle is made self-acting by means of spherical chambers which are attached to the ends of rocking arms, set at an obtuse angle into the valve socket, the plug acting as a fulcrum pin wherein the communications with the boiler and the supply cistern are situated; when one of the spherical chambers is down on the plane of the fulcrum, the communication is opened between it and the boiler; in this position it will remain, until feed water is required and an outflow takes place; the other spherical chamber being raised and receiving water from the supply cistern, the communication therewith being open and common to both spherical chambers when in that position. While the exhaustion of the lower chamber is going on, the top chamber is being filled until its superior weight causes them to change position; this operation is kept up alternately with both.

The invention is applicable to marine boilers.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, July 11.—Nº 1674. (* *)

JACK, JAMES.—This invention relates to the arrangements and construction of surface condensers. The exhaust steam from the cylinders first passes through a feed water heater described in a patent granted to this inventor the 14th October 1859, Nº 2345. " In a suitable casing placed under the water line and supply " respectively for marine and land purposes, is stepped a vertical " shaft, on which is affixed arms, vanes, or similar mechanical " arrangements having a screw-like shape and action when in " motion. Surrounding the above arms or vanes are a number " of vertical tubes, opening into chambers in the top and bottom. " The steam from the cylinders is admitted at the top, and " condensed in its passage to the lower chamber by contact with " the cold surface of the tubes; these tubes are kept cool by " a constant supply of cold water, either from pressure when " placed under the supply, or from a pump, and by the agitation " or circulation caused by the arms or vanes being put in motion " (say by toothed or friction wheels, or other couplings to the " engine) and which serve to carry upwards and throw off or " into the boiler the heated or surface water in the condenser." " A second modification may be arranged with the vertical shaft " hollow or surrounded by a casing, leaving an annular passage, " which admits the steam to the inside of long arms, screws, or " vanes, and to a chamber at the bottom of the condenser, or open " to the cold water under the ship's water-line, or otherwise."

[Printed, 1*s*. Drawings.]

A.D. 1860, July 14.—Nº 1700.

AUSTIN, HENRY GEORGE.—(*Provisional protection only.*)— " Improved apparatus for propelling vessels."

The paddle-floats are shaped like the blades of canoe paddle, and are feathered by turning on their axes radial to the paddle shaft.

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 21.—Nº 1772.

MENNONS, MARC ANTOINE FRANÇOIS.—(*A communication from Vincent Gâche, senr.*)—" Improvements in the construction " and arrangement of marine steam engines."

The engine has two cylinders, one over the other, with a common piston rod and one slide valve, and the steam goes from the boiler into and through hollow piston rods, pistons, and cylinder sides and covers by casings and apertures, so that steam when used expansively has little loss from the amount of metallic surface exposed.

The manner of working the reversing gear and the "super-" heated water" is explained. The reversing motion is effected by the piston. Communication is opened between the cylinder and the condenser, so that the pressure on both sides of the piston is equalized. The slide valves may then be worked by a lever. For "superheating" water, the water is pumped from the condenser into a "capacity," "when it takes up a large portion of " the heat of the steam passing into the condenser." Thence it passes to the boiler. The apparatus for superheating the steam is enclosed in the steam chest.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1860, July 24.—N° 1787.

HIRSCH, Hermann.—" Improvements in screw propellers."

The blades are fixed on the boss in such a manner that each may be turned round so as to vary its pitch by its relative position on the part of the boss which constitutes its seat. Each blade is turned true in a conoidal or spheroidal form about an axis at right angles to that of the shaft. Washers are fitted into recesses so as to secure the blades from unintentional displacement.

[Printed, 6*d*. Drawing.]

A.D. 1860, July 27.—N° 1818.

SCHÖN, Carl.—(*Provisional protection only.*)—" Improvements " in the construction of propelling wheels for ships."

" A paddle-wheel is enclosed in a cylindrical encasement, " open to the extent of its whole length, of which about one- " sixth part of its periphery and both ends of which cylindrical " encasement have apertures. The whole machinery is fixed to " the aft of the vessel, and is connected with and is put in motion " by the steam engine. The lower part of the cylindrical encase- " ment will be nearly at a level with the keel of the vessel, the " open part of the cylindrical encasement being reverse to the " vessel itself. At each end of the encasement a box is attached

by these openings
water passes in and out

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ection only.)—" Improve-
vessels, and in the mode

ottom or hull of the vessel
ed upwards from amidships
with gradual curves, so that
may be increased by reducing
water, and the hull thereby
e employment of my improved
consist of horizontal sliding
ged leaves or floats, to which an
n through the medium of eccen-
shaft of the engine, the said engine
a cylindrical boiler or generator
flues passing from the lower to
said boiler, and thereby effecting

28.—N° 1837. (* *)

—This invention has for its object
ssels of light draught, propelled by a
this object "I place the wheel in an
vessel, usually at a point some distance
and behind the wheel I make a groove
of the vessel for the water to escape
groove or passage is not made of suffi-
to any extent into the upper part of the
ne, but usually I make the bottom of
ide with the ordinary draft line of the
ordinary circumstances the part of the
nd the wheel does not enter the water,
vessel be heavily laden it becomes im-
supporting the load. I prefer that the
way from the wheel, should expand or

" become wider laterally to allow the water to escape more readily;
" and for the same purpose I cause the parts of the vessel on the
" two sides of the groove to decrease in draft progressively in
" passing from the wheel to the stern. If it be desired, as in the
" case of a vessel having frequently to steam astern, the groove
" may be continued to the bows of the vessel in advance of the
" wheel, making the two ends of the vessel similar the one to the
" other."

[Printed, 1*s.* Drawings.]

A.D. 1860, August 8.—N° 1917.

DAVIDSON, FRANCIS. — "Improvements in marine steam " engines."

The feed water is heated by passing it through annular spaces about the tube through which the waste steam passes. The waste steam pipe may be made spiral.

[Printed, 4*d.* No Drawings.]

A.D. 1860, August 9.—N° 1927.

GRIMALDI, Doctor FILIPPO.—"Improvements in the instantaneous generation of steam."

An "improved generator is composed of a cylindrical vessel
" ended either by two calottes or flat plates placed in the furnace,
" and supported by two axles mounted on suitable bearings, so
" that the vessel may rotate thereon as on the journals, and present successively every part of its cylindrical surface outside to
" the direct action of the fire below, and inside to the water it
" contains." One axle is hollow, and contains the feed and steam pipes. On the other is mounted a pulley, by which the apparatus may be caused to revolve.

Reference is made to this Specification in No. 3207, A.D. 1861.

[Printed, 10*d.* Drawing.]

A.D. 1860, August 13.—N° 1953.

STODART, JAMES, and BENETT, JOHN THOMAS.—(*Provisional protection only.*)—" Improvements in ships' propellers."

Three or more " screwed blades " are fixed between a central boss and an outer ring or cylinder.

[Printed, 4*d.* No Drawings.]

A.D. 1860, August 18.—Nº 2001.

CRISPIN, William Henry.—"An improved propeller."

The shaft carries two blades set at angles as screw propeller blades. The shape of each is a lune with the angles rounded off, and the axis of the shaft passes through a point in the shorter diameter of the lune.

[Printed, 6*d*. Drawing.]

A.D. 1860, August 24.—Nº 2045.

RÉVY, Julian John.—"An improved construction of screw "propeller."

The "propeller is so constructed that its acting screw surfaces "have no relative velocity to the water which surrounds them." "The screw surfaces are so peculiarly constructed that cells are "formed, through which the water is caused to flow." The blades turn in a tubular space, and so that the water enters by an aperture of one cross section and passes out by an aperture of a greater section.

[Printed, 6*d*. Drawing.]

A.D. 1860, August 27.—Nº 2062.

BOUSFIELD, George Tomlinson. — (*A communication from E. S. Renwick.*)—"Improvements in thrust bearings for propeller "shafts, and for other purposes."

The shaft passes into a steam-tight chamber in such a manner that the steam may operate upon its end, or upon a collar fixed on the shaft, and thus take the whole or part of the thrust pressure.

The motion of the shaft in the direction of its axis, owing to different strains upon it, is caused to increase or diminish the supply of steam, so as to maintain the apparatus in equilibrium.

[Printed, 8*d*. Drawing.]

A.D. 1860, August 29.—Nº 2081.

VINES, Richard.—(*Provisional protection only.*)—"Self-acting "transverse floats for the propelling of steam vessels without "any backwater."

Each float of two series of "first class" and "second class" floats turns on its radial axis, and has its surfaces on each side of the axis of different areas and weights, so that it is inclined to the plane of rotation at different angles, partly by the difference in weight, and partly by the action of the water on the different areas.

" The following statement will show how this is accomplished :
" —The wheels, as likewise the floats, are made of metal or
" otherwise, and intended to work the vessel on the right and
" left sides; each wheel having a central body, from around which
" is passing three or more rows of spokes, diverging towards their
" outer circumference, and surrounded by one or more felloe-like
" bands connected together transversely, directly, or indirectly.
" Such connection not only tend to strengthen each wheel, but keep
" the floats in their proper situation. The wheels as also differ
" in form, but still the general principal as regards the invention
" are the same in each. These wheels are divided into first and
" second class. There are in the first class three or more rows of
" rods and spokes, sixteen or more in each row, and to every
" spoke of the inner row of the right and left wheels less than a
" fourth from the inner circumference of the felloe by a cilin-
" drical hinge and shoulder-like structure, is attached a float.
" The inner rows of spokes being those nearest the sides of
" the vessel are those from which the floats take their moveable
" action, while the middle and outer rows of spokes (or if more)
" of the right and left wheels not only strengthen but act as
" stops preventing the floats previous to and while in the water
" assisting in propelling the vessel taking only a transverse
" direction. The second-class wheels are right and left, having
" three or more rows of spokes in each, but the number of spokes,
" as likewise the floats, are less than in the first class. The
" number of spokes, as also the floats, are different in different
" wheels. In each the floats are larger than in the first-class
" wheels, and instead of being attached by a hinge-like structure
" to the inner first row of strokes are placed on the second,
" extending a greater distance toward the body than in the first-
" class wheels, while the outer row of spokes, as in the latter,
" act as stops, preventing the floats previous to and while in the
" water taking otherwise than a transverse direction. The first
" inner row of spokes not only tend to strengthen each wheel, but
" keep the floats in their situation."

[Printed, 6*d*. *Drawing.*]

A.D. 1860, September 13.—N° 2206.

WATTS, GEORGE EDWARD.—(*A communication from Thomas Tapp.*)—(*Provisional protection not allowed.*)—" An improved pro-" peller wheel for ships."

" This invention consists in having the blades of the propeller " wheel formed in respect of their main propelling surfaces, and " also in respect to their outward arcs with the following distin-" guishing characteristics: — The main inward surfaces of the " blades upon both faces thereof describe arcs with a radius one-" half the length of the radius of the wheel, and the outward " curve or hook of the blade upon both faces thereof describes arcs " with a radius one-fourth the radius of the wheel, and with " gradually diminishing cords, whereby in action the blades " 'push' against the water in a manner to give the water moved " by the blades a spiral motion without breaking the volume of " the water moved, consequently the blade has exerted its pro-" pelling power before it leaves the water as at first moved, and " does not therefore lift or carry water, and is nearly or quite " free from the 'slip.' "

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 14.—N° 2229.

BEDDAT, PIERRE ANDRÉ.—(*Provisional protection only.*)—" A " new propeller."

Two horizontal shafts across the vessel carry at each end of each three cranks at equal angular distances, but of the same throw, and three bars on each side of the vessel connect the corresponding cranks, so that as the cranks revolve the bars keep horizontal while they dip, rise, and return to their original positions.

Vertical floats on the bars act on the water to propel the vessel.

[Printed, 6*d*. Drawing.]

A.D. 1860, September 22.—N° 2317.

BUDDEN, JOHN LEGGETT.—(*A communication from Woodford Pilkington.*) — " Improvements in the application of steam or " highly rarefied gas or other aeriform fluid to obtain motive " power for propelling and other purposes."

Air, steam, or gas is led to the ends of the fans of screw propellers, so as to cause them to rotate by the reaction of the water, and thus to propel the vessel. The direction of the motion is regulated by causing the aeriform fluid to flow through sliding tubes with openings in the hollow propeller shaft.

[Printed, 10*d.* Drawing.]

A.D. 1860, September 26.—N° 2333.

TRUSS, **Thomas Seaville.**—(*Letters Patent void for want of Final Specification.*)—" Improvements in apparatus for the traction " and propulsion of ships, boats, and other nautical vessels."

The propeller shaft carries one or more " wings, shares, scoops, " or cutters " in a manner not described, except that they " do " not form a screw as heretofore used for the traction or pro- " pulsion " of vessels.

The forms of the bosses and vanes are delineated in 115 figures.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1860, September 26.—N° 2341. (* *)

MACNAB, **William.**—This invention relates to steam engines and boilers. A set of marine engines designed for screw propulsion are shown; they comprise a pair of direct acting inverted low-pressure cylinders, and in the space between them a small pair of high-pressure cylinders, the piston rods of which are connected to one cross head, which acts upon the central throw of the crank shaft, while the low-pressure cylinders which are disposed on the line of the crank shaft, act upon the two outer throws, the three throws being set at an angle of 120° in relation to each other. One piston valve works the two high-pressure cylinders, but the low-pressure cylinders have separate valves. The high-pressure cylinders and piston valve are enclosed within, and exhaust into a casing which forms a reservoir for the steam supplied to the low-pressure cylinders, to which the casing is bolted. The cylinders may be arranged to work horizontally. With regard to condensing steam, preference is given to the modes described in the Specifications of two patents granted to this inventor, and bearing date respectively April 21, 1860, No. 1001, and June 27, 1860, No. 1557. The boiler is of the vertical class, surrounded by a water space; the form of the furnace is annular, the centre being occupied by a double cylindrical casing, forming a circular water space round the centre which is open to the flues; the inner shell of the central water space spreads or expands over the fire so as to bring the burning gases in contact with the inner surface of the surrounding water space; the draught passing upwards then takes an inward direction towards the centre, through a number of vertical water tubes disposed in a circle, and connecting the central water space with the upper part of the boiler, the fire draught passing out of the crown of the boiler through a number of vertical fire tubes, which superheat the steam in the steam chamber above the water level. Four external pipes form an additional communication between the upper and lower parts of the boiler, and help to keep up a perfect circulation of the water.

[Printed, 1s. Drawing.]

A.D. 1860, September 28.—N° 2351. (* *)

MARTIN, WILLIAM ARENA, and PURDIE, JAMES.—This improvement consists in a method of giving motion to the fire-bars of marine and other steam-boiler furnaces for the purpose of clearing them from ashes and clinkers. "For this purpose the "fire-bars are supported at or near their centres in such a manner "as to be capable of rising and falling when acted upon by suitable cams or levers. Beneath the front end of the bars a horizontal shaft carries a series of moveable cams, which project "alternately backward and forward. From each of these cams a "connecting rod or link passes up to the under side of the fire-"bar above it. On giving a rocking motion to the cams by "means of a lever handle, the ends of each of the fire-bars rises "and falls alternately." "Revolving cranks may also be used "instead of vibrating cams if preferred." "When it is not "required to give motion to the fire-bars, the cam shaft is secured "by a detent."

[Printed, 6d. Drawing.]

A.D. 1860, October 2.—N° 2374.

PARKER, JAMES.—(*Provisional protection only.*)—"Improve-"ments in propelling vessels by the buoyant power of steam, hot "air, and vapour in combination in rising through water."

High-pressure steam is discharged into an open pipe, where it becomes mixed with atmospheric air, rarified by the heat of the steam. This "combined product of steam, hot air, and vapour

" issues forth into the water, and by its rising against the vessel " or apparatus at an angle, it propels the vessel by its buoyant " force or power, which is in proportion to the amount of displacement produced by the rising bulk of steam, air, and " vapour." The pipe is to be covered with a non-conducting substance, and may be led down outside the vessel, or " through " the bottom or stern."

[Printed, 4*d.* No Drawings.]

A.D. 1860, October 3.—N° 2396.

MAHON, Arthur Irwin.—" Improvements in screw propellers, " applicable also for raising and forcing water and other liquids, " and obtaining motive power from the same."

A thin spiral flange of sheet iron or other material is fixed to a shaft. The screw so formed may have " one, two, or several " turns." This screw is enclosed in a cylindrical case that may either revolve with it or be fixed. The " cylinder may project " beyond the screw to confine and direct the water." The screw may be in a channel beneath the vessel, " or in a case within the " vessel communicating at one end with the water." The screw may be divided into two lengths, and have " a belt round the " junction to confine the water." The screw may be used for other purposes besides propelling.

[Printed, 1*s.* Drawings.]

A.D. 1860, October 15.—N° 2509.

SINGER, Isaac Merritt.—" Improvements in the construction " and fitting of steam vessels." Three hulls are fixed side by side, connected by suitable bearings. Between the hulls, at about the middle of their length it is proposed to mount a pair of paddle wheels, driven by means of steam engines contained in the middle hull. In some cases the paddle wheel shafts are to be continued through and beyond the side hulls, for the purpose of receiving side propellers. If thought desirable for the sake of speed, stern screw propellers may be fitted to the side hulls, and driven from engines in the side hulls or in the middle hull. These screw propellers, and also the side paddles, when the same are used, may be made to unship in case of a storm coming on, the propulsion of the ship being then kept up by the paddle wheels between the hulls.

"As the ordinary mode of steering vessels by a rudder at the "stern may not suffice for this novel construction of compound "vessel, more especially when moving in narrow waters, I provide "at the opposite ends of the central hull a pair of engines for "driving respectively a propeller shaft mounted in a line with "the keel of the hull. These shafts I fit each with a paddle wheel "or other propeller, the same being intended to steer the vessel "either singly or simultaneously, as desired. When the vessel "is at sea, it will be desirable to raise one and occasionally both "of these steering paddle wheels out of the water," for the performance of which operation proper provision is made.

[Printed, 10*d*. Drawing.]

A.D. 1860, October 16.—N° 2518.

ROBERTS, Richard, and SYMONDS, Thomas Edward.——(*Provisional protection only.*) — "Improvements in marine "steam engines, and in machinery and apparatus connected "therewith."

A surface condenser with tubes is arranged so that access may be had to the tubes by removing a gland or joint.

The apparatus is placed below the level of the water, so as to have a current of cold water through it, and it is so inclined that the cold water enters at the lower end, and the hot water from the condensed steam flows to the lower end, so as to be conveniently removed. Deflectors cause the cold water to impinge on the various tubes.

Boilers are fed by a pump worked by a lever which is adjustable in its stroke without stopping the pump. This is effected by a sliding bearing, so that the positions of the fulcrum, and therefore the stroke of the lever, may be regulated.

Twin screws are to be used for propelling vessels, one under each quarter.

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 22.—N° 2576. (* *)

HART, George William.—"Improvements in the construc- "tion of vessels of war, and in propellers for the same."

The screw propeller is made "of such form as that the "portion of each blade nearest the shaft shall merge gradually "into the circumference of such shaft instead of forming a "radius to it as at present, and the outer end of each blade or

" the part furthest from the shaft shall recede gradually from " such shaft and the face of such blade, at the same time gradually rising from being parallel to the shaft, until at the " termination of the blade it forms a radius to the shaft either " at right angles or inclined towards the stern or forward part of " the shaft, as preferred."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, October 30.—N° 2657.

HENDERSON, James McLintock. — " Improvements in " marine steam engines."

The sole plate forms the condenser and principal basis of the engine, and the cylinders are arranged so as to converge to the shaft.

Iron feathering paddle floats are protected by an outside or secondary ring on the paddle wheel, and the cranks for the feathering action are on the faces of the floats which act first in the water in going ahead.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1860, November 1.—N° 2676.

HARRATT, Charles.—" Improvements in machinery used in " giving motion to a shaft or axis used in propelling vessels, " ploughs, and machinery."

Steam power is used in conjunction with manual power, so that while the latter turns a crank through that part of its revolution where little power is required, the steam power comes into operation for the rest of the course.

This is applied to various purposes, among which are ploughing or digging, and rowing or paddling.

For propelling vessels the paddle wheel has only two floats at each end of the same shaft, and the steam power acts only when one of the floats is just entering the water.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, November 6.—N° 2718.

RAMMELL, Thomas Webster.— " Improvements in centrifugal discs revolving in air, water, and other fluids, and in the " application of motive power by such discs."

A ship is propelled by a centrifugal disc which "consists of "a flat hollow circular wheel or case made to revolve upon an "axis passing through its centre. The disc is thicker or broader "at the centre, and diminishes gradually in thickness or breadth "towards the circumference." It is "divided into passages or "compartments by internal partitions" from the centre to the circumference.

When used for propelling ships, it is "placed in the middle of "the vessel, and with its centre or axis below the level of the "water." The water is admitted by a tube in the fore part of the vessel to the centre of the disc. The disc is made to revolve in a vertical plane, and the water is driven out. A "pressure "chamber" is constructed about the disc, and the water directed aft through tubes from this chamber.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, November 6.—N° 2723.

GYTON, JOHN BENSTEAD. — (*Provisional protection only.*)— "Improvements in paddle wheels."

The floats of paddle wheels are in long sectors, arranged like the parts of a fan, and kept together at one end by a central pin, while flexible or chain couplings enable the other ends to be expanded so as to form a wider arc when required for use, or to be folded again and removed, for which purpose also they may be separated by drawing out the centre pin.

[Printed, 4*d.* No Drawings.]

A.D. 1860, November 9.—N° 2762.

LEWIS, DANIEL BALDOCK.—(*Provisional protection only.*)— "Improved apparatus for propelling steam vessels."

Floats united by hinges so as to collapse for the return stroke by closing like the leaves of a book, are worked to and fro in the water to propel a vessel.

[Printed, 4*d.* No Drawings.]

A.D. 1860, November 13.—N° 2780.

NEWTON, ALFRED VINCENT.—(*A communication from Byron Densmore.*)— "An improved construction of feathering paddle "wheels."

The floats are feathered by levers working in slotted arms by an excentric boss which may be on the inner part of the shaft, and guided either by a fixed grooved piece on the vessel's side, or by arms and rollers working between them.

[Printed, 8*d*. Drawing.]

A.D. 1860, November 16.—N° 2814.

DREWE, HENRY GREGORY.—(*Provisional protection only.*)—
" Improvements in propelling vessels, and in the apparatus or " mechanism for the same."

Air compressed or not and with or without a mixture of water is forced out under water to propel a vessel. Self-acting valves in some of the conducting pipes allow the reacting ingress of water between the strokes to be taken advantage of, and thus " the impulsive force of steam or other agent can be most " effectively applied."

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 19.—N° 2840. (* *)

NEWTON, WILLIAM EDWARD.—(*A communication from Louis Brandt.*)—(*Provisional protection only.*)—" Improved means of " and apparatus for supplying air to the furnace or furnaces, or " to the fire rooms of steam vessels, by means of the paddle- " wheels."

" This inventon consists of improved means of and apparatus " for supplying air under pressure to the furnace or furnaces or " to the fire-rooms of steam vessels by means of the paddle " wheels. To this end a pipe or pipes is or are conducted from " the wheel houses down to some convenient spot near the fire- " rooms, or to an opening under the grates of the furnaces, or " near the fires, so that a current of air may be forced down to " the fire-room or to the furnaces by the motion of the paddle " wheels."

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 21.—N° 2854.

HOWDEN, JAMES. — " Improvements in steam engines and " boilers, and in the apparatus connected therewith."

In double-cylinder expansive engines, two smaller cylinders which receive steam from the boiler are placed against the end of a larger one which receives steam from the smaller ones. The piston rod of the large cylinder passes through a stuffing box between the small cylinders. The piston rods of the small cylinders are attached to the piston rod slide block of the large cylinder by a cross piece and rods. Or there may be two rods from the larger cylinder.

In similar engines there may be a "trunk for the admission of "the connecting rod from the larger piston working through a "stuffing box between the two smaller cylinders." There may also be two pairs of smaller cylinders, one pair smaller than the other. The steam passes into the smallest first and thence on.

Or there may be three cylinders of different sizes, which receive steam successively. The cylinders are in connection with a lever, two being on one side of the fulcrum, and one on the other.

Two low-pressure cylinders of equal size may receive steam from two high-pressure cylinders of equal size. The four cylinders are arranged with their axes parallel at the corners of a parallelogram. The piston rods are united to a cross-piece on which is the joint of the connecting rod. An improvement in slide valves is described, in which by means of a plate at the back of the valve, fitted either with an india-rubber band or a hollow metal projection at the back, the valve moves with less friction. "An "improvement in 'cut-off' valves consists in having a cylindrical "valve in the steam ports of the cylinder working in conjunction "with the slide valve."

Steam is exhausted from the cylinders to a surface condenser, and condensed "by drawing air through or among the tubes." The air thus heated is conducted to the furnace. Water may be sprinkled on the tubes to assist condensation.

The tubes of surface condensers are fixed at one or both ends by packing.

In refrigerators the "cooling currents" are made to "run in "opposite directions to the water to be cooled, with a strip of "leather" "on each side so as to make a joint with the sides of "the vessel." These refrigerators are mentioned as being "particularly applicable to marine engines."

To regulate the speed of steam engines, the part of the shaft from which the power is taken, is separate from the engine shaft, and the two are connected by a "clutch or disc" with springs, which, on being compressed, actuate levers to cut off the steam.

Various modifications of an improved boiler are described, consisting of arrangements of cylindrical vessels arranged about the fire-place and connected by tubes.

Water tubes are arranged in the chimney, among which the products of combustion pass.

[Printed, 2*s.* 2*d.* Drawings.]

A.D. 1860, November 28,—N° 2919. (* *)

MARDELL, David. — (*Provisional protection only.*) — This relates to steam engines and obtaining feed water from marine boilers. The connecting rods of two high-pressure cylinders actuate one crank shaft, and the connecting rod of a low-pressure cylinder works on to another crank shaft, the two shafts being so connected by gearing, that the low-pressure piston makes two strokes to every single stroke of the high-pressure piston. The three cylinders are placed close to each other; the two high-pressure cylinders exhaust near the end of the stroke through a series of holes in their sides into direct steam passages, which conduct their exhaust steam to the low-pressure cylinder without passing through the ports or valves; the high-pressure pistons are worked by ordinary slide valves, and the low-pressure cylinder exhausts through the high-pressure cylinders into the condenser, or through a slide valve in the usual manner. During the latter part of the stroke of a high-pressure cylinder, it exhausts into the condenser. The two exhausting series of holes in the high-pressure cylinders are so regulated by valves that during the up-stroke of the high-pressure pistons the lower series of holes are closed, and the upper series during the down stroke.

Fresh feed water is obtained from sea water admitted into a closed vessel to which heat is applied; the use of a pump produces a partial vacuum in the area above the water, whence a thick vapour of fresh water rises, "which is carried away by the " pump and delivered into a vessel, wherein it condenses, being " fresh water."

[Printed, 4*d.* No Drawings.]

A.D. 1860, November 29.—N° 2930.

HIRSCH, Hermann.—"Improvements in screw propellers."

The invention relates to the form of the surfaces of screw propeller blades.

" The improvements apply to the form of the blades of propel-" lers for vessels," the surfaces of which are made " of such a cur-" vature that if sections were made by cylindrical surfaces con-

[illegible] profiles of the sections
[illegible] a pitch gradually
[illegible] a manner that every
[illegible] from the entering
[illegible] impulse backwards as
[illegible] were made by planes per-
[illegible] the profiles of the
[illegible] lines concave towards the
[illegible] that every portion of the
[illegible] water impels it to some extent
[illegible] a portion of its
[illegible] blade which acts on the
[illegible] curvature as to combine
[illegible] namely, the curvature of
[illegible] cylindrical sections, and the
[illegible] planes perpendicular to the

[illegible] December 4.—N° [illegible]

[illegible] *Provisional protection only.*—"Im-
[illegible] propeller blades."

[illegible] improvements in screw
[illegible] increase in their width of surface
[illegible] more distant from the propeller
[illegible] that each screw propeller blade should
[illegible] screw of the pitch desired, excepting
[illegible] blades which after edges are each
[illegible] surface which is in its whole length at
[illegible] same angle to the propeller shaft as that
[illegible] screw propeller blade stands to
[illegible] of the blade should be "at a point
[illegible] screw from the centre of the
[illegible] may be varied.

[illegible] edge of the blade commences at or
[illegible] screw propeller blade which is
[illegible] wider as it proceeds outwards
[illegible] of the propeller blade: the
[illegible] to the after face of
[illegible] and consequently as the propeller blade
[illegible] which has been acted on and put in motion

" by the fore part of the blade is again struck by this after " portion of the blade.

" Screw propellers of smaller diameter than those heretofore " used may be employed without decreasing the propelling effect."

[Printed, 4*d.* No Drawings.]

A.D. 1860, December 12.—N° 3054.

KYLE, Alexander.—" Improvements in machinery or apparatus for propelling ships, or vessels, and boats."

A vertical shaft turns on a projection from the keel sternwards, and carries under water a frame with floats, each turning on its vertical shaft, and so geared as to cause the flat side to act on the water during any desired part of its circular course about the main shaft.

Thus the vessel may be both propelled and steered.

[Printed, 6*d.* Drawing.]

A.D. 1860, December 21.—N° 3139.

MOORE, Thomas.—" Improvements in navigating ships."

Partly the invention relates to screw propellers or side propellers, curved blades fixed in a boss to be disconnected for sailing.

The other part of the invention relates to sails and a mode of reefing and furling them by winding them on the yard or boom.

[Printed, 10*d.* Drawing.]

1861.

A.D. 1861, January 3.—N° 14.

FULLER, William Coles, JAQUES, James Archibald, and FANSHAWE, John Americus.—" Improvements in the " adaptation of india-rubber and analogous gums and compounds " thereof to valves, pump buckets, packing, and other parts of " steam, water, air, and gas engines and apparatus."

"Valves, steam packing, pump buckets, and other part of " steam, water, air and gas engines and apparatus" are made of " junction *rubber.*" This consists of vulcanized rubber and vulcanite united. In circular valves the central part is hard, and the outside soft. In other valves "the edge or holding part "is of soft material, sometimes strengthened with a layer of "hard." In packing for pistons, rings are used of elastic rubbing, with a coating of vulcanite next the piston. Large rings of the "junction rubber" are used as packing for the shafts of screw propellers. Tubing for steam engines may be also made of this material.

[Printed. 8*d*. Drawing.]

A.D. 1861, January 12.—N° 90. (* *)

WARWICK, THOMAS. — (*Provisional protection only.*) — This invention relates to "governors for steam and other engines." A weighted lever is jointed to an axis which revolves in suitable bearings; a collar, which slides upon the axis and rotates therewith, is actuated by a connecting rod jointed to the opposite end of the lever; fitted to a projection on the sliding collar is a friction roller, which acts on two inclines in connection with the throttle or other valve, to open or close it according to the position of the sliding collar in relation to the centrifugal expansion of the weighted end of the lever, which is due to the speed of the revolving axis. For marine and moveable engines, two arms or vanes angularly adjusted, with a perpendicular shaft, rotate under water in a vessel, causing a roller to rise or fall, whereby the throttle or other valve is actuated.

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 12.—N° 92.

FITZMAURICE, The Honorable WILLIAM EDWARD.—"Im-"provements in generating heat for locomotive, marine, and "other boilers and furnaces."

The "invention consists, firstly, in burning carbonaceous matter "or fuel in oxygen gas, or in oxygen gas diluted with atmo-"spheric air, and in the direct application of the heat thereby "generated to boilers or furnaces, or in the application of the "gaseous products of this burning of carbonaceous matter is the "fuel.

"Secondly, it consists in mixing water or steam with oxygen "gas or with atmospheric air, or with these combined, and in

" passing such mixture through heated or ignited carbonaceous " matter, and applying the gaseous product obtained therefrom " as fuel to boilers or furnaces by any convenient mode of " application."

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 15—N° 111.

SPENCER, John Frederick.—(*Provisional protection only.*)— " Improvements in steam engines and the machinery and apparatus connected therewith."

The invention relates to " improvements connected with steam " engines combined with surface condensers, and working with " surface condensation instead of by the ordinary system of " injection condensation."

The pumps for supplying the surface condensers are worked by a separate steam engine, which may be supplied from the main boilers.

A pump is used having its " work or load " on its down-stroke. The plunger of a combined air and cold water pump (patented March 29, 1858, No. 661, and January 17, 1860, No. 120), or of any force pump, is worked by a lever, which has one end attached to the piston crosshead, and the other to a fixed point. The load of the pump on its down-stroke thus counterbalances the weight of the steam piston.

To make up for the loss of fresh water, a " vapourizer or vessel " is used, into which salt water is admitted. Tubes from the boiler pass through or near it, and heat its contents, the steam from which passes to and is mixed with the feed water.

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 15.—N° 114.

WILSON, Robert.—" Improvements in screw propellers, and in " machinery or apparatus for actuating the same."

The blades of the propeller are shaped in their cross section like " a long and narrow ellipse, with pointed extremities," so as to cause little disturbance in passing through the water. The cylinders of the engine are placed above the propeller shaft, which works the pumps and valve gear by an excentric pin on a disc.

Priming is prevented in the boiler by so placing plates inside it as to cause the cool water when first supplied to come in contact with the highly heated lower plates. The steam may be superheated in tubes surrounding the smoke box.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, January 22.—Nº 171.

PHILP, RICHARD, and PHILP, JOHN.—(*Provisional protection only.*) — "An improvement in propellers for propelling ships, " boats, and other vessels in water."

The opposite screw blades are placed on the boss, "so that the " delivery edges shall lie in a plane parallel to the stern of the ship, " while the leading edges shall not lie down in a plane parallel to " the stern of the ship, but incline forward towards the vessel " from the front of the boss to the leading corner, and form an " angle, or nearly so, with each other at the point where they " would meet the shaft if continued to it. The blades being in " this position on the boss, we require that the delivery corners " shall be farther from the shaft than the leading ones, so that " the angle made by the crown and delivery lines should be about " 45°, while the angle made by the crown and leading ones should " be about 90°."

[Printed, 4*d*. No Drawings.]

A.D. 1861, February 1.—Nº 269.

CRICHTON, ALEXANDER.—" Improvements in applying and " fitting screw propellers, and in forming and fitting the stern " parts of ships for receiving screws."

The last (or outer) length of shaft is connected by a hinge-joint, so that the shaft and screw may be raised to a vertical position. The stuffing-box of the screw shaft and the thrust-box, are both forward of the joint. Suitable bearings are provided for the last length of the screw shaft, and the top bearings are moveable. The moveable part of the shaft must be "of a length " sufficient to enable the point of the lower blade of the screw to " come within the line of the inner stern post when the screw " shaft is vertical and the screw horizontal." The shaft may be turned up to any convenient angle equal to or less than a right angle. To receive the screw the inner stern-post is divided " from the boss upwards into two parts or thicknesses," and " a box or hollow space" is formed "immediately above the " narrower part of such opening." The screw fits into this box, and the shaft into the narrower space beneath. To admit of access to the screw this open space may be prolonged upwards above the deep load water line. To close the opening when the screw is raised a "sliding shutter piece" is provided, and the space above the screw enlarged to contain it. By this means undue strain on the outer stern post is avoided, and the ship rendered more obedient to the rudder.

[Printed, 8*d.* Drawing.]

A.D. 1861, February 21.—N° 430.

MILLER, James John, the younger. — "Improvements in "apparatus for governing or regulating the speed of steam and "other engines and machines."

Motion is transmitted from the engine shaft to the shaft of the apparatus. On it is a fixed block, against and touching which is a momentum wheel, free to revolve on the shaft, but incapable of sliding on it. Next the momentum wheel is a sliding sleeve. The surfaces at which the boss of the wheel and the sleeve come in contact are "feathered" or inclined, instead of being vertical. The sleeve, by means of a lever, governs the throttle valve. The lever is kept in position by a spring. When the shaft receives a sudden increase of velocity, it does not impart it to the momentum wheel, and consequently the inclined surfaces bear against one another, the sleeve is moved, and the throttle valve opened. Stops are provided to regulate the action of the momentum wheel.

[Printed, 10*d.* Drawing.]

A.D. 1861, February 21.—N° 432.

NEWTON, William Edward.—(*A communication from Charles Talbot Porter.*)—(*Provisional protection only.*)—"Improvements "in centrifugal governors for marine and other steam engines, "and other motors."

A spring embracing the central shaft by which governor balls are turned, is caused to act steadily, so that their axis of rotation may be inclined and thereby adapted for use in marine engines.

[Printed, 4*d.* No Drawings.]

A.D. 1861, February 25.—N° 485.

BARLING, John.—(*Provisional protection only.*)—"Improve-"ments in the mode of applying engine power to wheels and

" other like instruments employed in producing locomotion, " whether by land or water."

Whether cylinders are vertical or horizontal, the connecting rod through which they act on the shaft is to be horizontal when at its dead points. This is to be effected by introducing intermediate levers.

The valves are to be so arranged and an additional valve applied, that the steam may cease to act on one side of the piston while the engine is kept in motion by the steam acting on the other side only.

[Printed, 4*d*. No Drawings.]

A.D. 1861, February 26.—N° 492.

JAMES, William Henry.—" Improvements in the means or " apparatus for taking or catching of fish, parts of which im- " provements are applicable to propelling, and to arresting the " progress of ships and boats, and to the forming of communi- " cation therefrom to the shore."

The only part of this invention which concerns the present series consists in the application of floating bags or balloons inflated with air to the propulsion of vessels. These being acted upon by the wind or tide, and fastened by ropes of convenient length to the object to be moved are " applicable for the propel- " ling or dragging of small vessels, boats, rafts, or other vehicles, " off the sands, rocks, through the surf, or from other perilous " positions," " as well as for dragging vessels of any kind on or " through the water."

[Printed, 10*d*. Drawings.]

A.D. 1861, February 27.—N° 509.

WEALLENS, William. — " Improvements in steam engines " and boilers, and in propelling and steering vessels."

Engines with high and low pressure but with only two cylinders, are so arranged that at first the steam is admitted on high pressure (with a safety valve to prevent undue straining) into the low-pressure cylinder to start it, and this cylinder is worked by an independent slide or link motion.

A high-pressure boiler consisting of a barrel with tubes like those of a locomotive boiler has above it another barrel and tubes in two sets, one set to heat the feed water, and the other to superheat the steam. The steam or water from the lower barrel passes through tubes in the heated air of the combustion chamber which unites the upper and lower barrels.

Two screw propellers are used for steering a vessel by working them independently under the counter at each side, or when desired they may be worked together by means of a regulating apparatus, which operates upon the two throttle valves so as to cause the shafts to rotate with equal speed.

[Printed, 1s. 6d. Drawings.]

A.D. 1861, March 16.—N° 673.

BIRKBECK, GEORGE HENRY.—(*A communication from Edward Bruce Boughton Barker.*)—"Improvements in marine propul-"sion."

The propeller used is one form or another of a flat paddle board of great area worked angularly in a vertical plane by levers projecting over the vessel's side.

The flat vane feathers into a horizontal position or with its broad surface in a fore and aft plane for the return stroke, and provision is made for hoisting the apparatus or part of it by chains.

[Printed, 2s. 4d. Drawings.]

A.D. 1861, March 19.—N° 690.

HAWKSLEY, GEORGE WILLIAM, and WILD, MATHEW.—"Improvements in steam boilers."

These "consist in making them with a flue or flues (as the "case may be) composed of a series of cylinders in short lengths, "and of two or more unequal diameters, the ends of the said "cylinders composing the said flue or flues may be rivetted "together in various ways, but" the inventors "prefer flanging "the smaller cylinders outwards at right angles, and returning the "said flanges down again so as to enter the straight ends of the "larger cylinders to which they are rivetted. The said flanges "being turned up endways of the metal, form strong ribs round "the flue or flues, which greatly tend to prevent the same "collapsing under high-pressure steam, but that which is the "main object". of the "invention is the construction of boilers "with flues capable of expanding and contracting in their length "*without causing* leakage or injuring the ends of the boilers."

The improvements are also applicable "to the shells of boilers, "and may be used in puddling furnace and all kinds of stationary, locomotive, and marine boilers. In case of multitubular boilers," allowance is made "for expansion and contraction by bending their tubes either in direction with their lengths "giving them a waved appearance, or else by twisting them so "as to form spiral tubes; in either case expansion and contraction can take place without thrusting the rivetted ends of the "said tubes from the tube plates, and the flames in passing "through such tubes will act with better effect than in the case "of straight ones."

[Printed, 10d. Drawing.]

A.D. 1861, March 20.—Nº 694. (* *)

WATSON, Joseph, and **DAVISON**, Thomas Benjamin.—"Improvements in the mode of applying and securing thowl pins "or rowlocks to boats, barges, lighters, and all craft propelled by "means of oars or sculls." A box or case of suitable form and size is to be affixed inside the boat, underneath or level with the gunwale. This box or case is to contain one or more thole pins, made to work in suitable grooves or guides. The thole pin or pins are to be connected at the bottom end or ends by a transverse piece, and in or about the centre of such transverse piece is to be affixed a pin or plug to project through a slot in such box or case, by means of which such thole pin or pins may be raised through openings in the top of the box, such openings to correspond in size and shape to the pins. The pins when raised are to be held in place by a slide bolt, or other suitable fastening, underneath or through the pin or plug projecting through the slot.

The side of such box or case to be made to take off or open, to allow of broken or damaged thole pins being replaced or repaired.

The "pins, box or case, and internal and external fittings "thereof, to be made of wood, metal, or such other material as "may be deemed most suitable."

[Printed, 4d. Drawing.]

A.D. 1861, March 20.—Nº 695.

SYMONS, Alexander.—(*Provisional protection only.*)—"*Improvements in apparatus for propelling and steering vessels.*"

A screw propeller working in a water-tight casing is caused to draw in and expel water through tubes, and by opening or closing these the vessel may be propelled and steered.

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 21.—N° 709.

BAXTER, George. — (*Letters Patent void for want of Final Specification.*)—" Improved apparatus for propelling vessels."

Blades are arranged about a boss on a shaft which is moved horizontally fore and aft. The blades are hinged to the shaft so as to feather for the return stroke. Several of these propellers may be employed.

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 22.—N° 718.

TRUSS, Thomas Seaville.—" Improvements in apparatus for " propelling ships and other vessels."

The improvements consist, firstly, in constructing the blade of a propeller " so that it shall increase in pitch or curvature from " the fore part of the place at which it is fixed upon the boss, " shaft, or axle of the propeller to or towards the point or rear " end of it; secondly, in constructing the blade so that it shall " have a curvature in a diametrical direction or across the face of " it, and the blade is mounted upon the shaft or axle of the " propeller (by means of a boss or otherwise), so that the concave " or hollow face or surface of it shall act against the water " behind the vessel in which the propeller is mounted for the " purpose of propelling it; and thirdly, in fixing such a blade or " blades upon the shaft or axle of a propeller at an angle varying " from that of a radial line drawn from the centre of rotation, " that is to say, so that a line drawn across or along the concave " face or surface of each blade to or towards the centre of " rotation of the propeller shall form an angle with the central " line of the axle, which shall be considerably less than 90 degrees, " about 40 degrees being, I believe, the best angle."

The second part of the improvement consists in making the blade " so that it shall vary in curvature from the fore part of it " to the point or rear (firstly in one direction, and then in an " *opposite direction)* in what may be called an O.G. line, one part

“ of the face at the fore part the end which is attached to the “ axle or boss being made convex, and the other part concave.” This blade is attached to a “ propeller shaft or axle in like manner “ as the blade firstly above described. Two or more of either of “ these blades may be combined or fixed on the same shaft or “ axle to form a propeller for the purpose of obtaining increased “ power or propulsion.”

[Printed, 8d. Drawing.]

A.D. 1861, March 22.—Nº 724.

HUMPHRYS, Edward.—“ Improvements in steam engines.”

“ Improvements in that class of engines known as Woolf's “ system,” to render them suitable for driving screw propellers. The large cylinder is placed on one side of the screw shaft, and between it and the ships' side is placed the small or high-pressure cylinder, “ the axis of both cylinders being in a horizontal line.” The pistons of the two cylinders are connected by a central rod. Their motion is conveyed to the shaft by rods “ eccentric to the “ cylinder connected to the large piston at one end, and to a “ cross bar at the other, from which cross bar a connecting rod “ transmits the motion to the crank pin.”

[Printed, 10d. Drawing.]

A.D. 1861, March 26.—Nº 759.

DAVISON, Thomas, and PATERSON, Robert.—“ Improve- “ ments in and connected with steam engines.”

The tubes of the condenser are bent and twisted in various ways. They may have “ indentations running helically rounds “ and along the tubes,” “ circular or other indentations ;” or they may be of “ serpentine, corrugated, zig-zag, and similar “ forms.”

A frame carrying a number of rods may be used to clean out the condenser. The rods are arranged to enter a number of the tubes at once. In a similar way a plate with suitable holes for the passage of the tubes may be used to clean their outside surfaces.

“ In a modification of engines with inverted steam cylinders, “ such as are used for driving the screw propeller, the air pump “ and circulating pump are placed horizontally to one side of the “ shaft, and beneath or at a lower level than the condenser. “ These pumps are actuated directly from the shaft by means of “ the eccentrics placed in each case, by preference, on the radial

" part of the crank, and having about half the throw of the crank, " each eccentric acting on an inner rectangular frame, working " vertically in a rectangular frame fixed on the pump rod. The " opposite sides of the frames may be arranged to work the feed " and bilge pumps, and to reduce the friction of the eccentric it " may be encircled by a series of anti-friction rollers, upon which " the inner rectangular frame bears.

" In the case of oscillating engines the air pumps and circulating " pumps are worked by the motion of the cylinder, the piston rod " being provided with suitable guides to sustain the transverse " strain arising therefrom. In some cases a supplementary pump " cylinder is arranged in connection with the valves and passages " of the circulating pump, with provision for working it by " auxiliary power, for the purpose of continuing the action of the " condenser when the main engines are not working; or, instead " of this, provision may be made for disconnecting the main pump " from the engine and driving it by auxiliary power. The con" denser is disposed with its tubes arranged horizontally and " parallel to the shaft, and it is preferred to carry the hot well up " the outer side of it. The head or outer door of the condenser " is formed with a chamber arranged to act as an air vessel to " relieve the shocks of the circulating pump.

" The mode described of arranging and working the pumps " may be adopted along with a horizontal or other position of the " steam cylinders, and the pumps may be disposed at right " angles to the steam cylinders, or in other relative positions."

[Printed, 10*d.* Drawings.]

A.D. 1861, April 8.—Nº 862.

BLAKE, Henry Wollaston. — " Improvements in coining " machinery and in apparatus employed for regulating the ex" pansion of elastic fluids."

The only part of the invention relating to the present subject is described as follows:—

" The invention also consists in the application to a cylinder in " which the pressure of air, steam, or other expansive vapour acts " on a moveable piston of a circular valve independent of the " slide or other valves used for the admission or exit of the air " or vapour, by which the expansion of the elastic fluid in the " *cylinder can be regulated* at pleasure. For this purpose two

" moveable cylinders are employed, one inside the other, and " both placed within an outer casing. The internal cylinder con- " stantly revolves with the engine, and the air or vapour is " admitted into its interior at one or both ends, and escapes " through a longitudinal opening extending throughout nearly " its entire length. The second cylinder, which is external to " this revolving cylinder, has also a longitudinal opening, through " which the steam or air has to pass, and is capable of being " turned round by hand to any position, by which means the " aperture is so placed as to cut off the air or steam at any " portion of the stroke.

" This arrangement of an expansion valve is more especially " applicable to land and marine steam engines."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, April 10.—N° 880.

LAMB, Andrew.—(*Provisional protection only.*)—" Improve- " ments in condensers."

The first part of the invention consists in an arrangement " of valves, cocks, and pipes, by which a continuous flow of " water is kept up, to assist or utterly dispense with the use " of the pumps which are commonly used for the purpose of sur- " face condensation in steam engines." In screw steam ships gratings are placed projecting from the vessel's side, forward and aft. Water enters by the forward grating, flows through a valve into a pipe leading to the condenser, thence through a second pipe, and out at the aft grating. A lip on this grating directs the water towards the propeller, and its action " assists in drawing the " water through the pipes." " In paddle-wheel ships the arrange- " ment is similar, only the inlet and outlet pipes are shorter."

In the second part, the steam boilers are connected with the condensers by pipes, so that surplus steam can be passed to the condenser instead of being wasted.

The third part does not refer to the present series.

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 10.—N° 881.

PECK, William Bishop.—(*Provisional protection only.*)—" Im- " provements in screw propellers."

The blades of a screw propeller " are formed with an ogee

" curve from the base to the point, so as to hold the water while " traversing along the channels until it is permitted to escape."

The heads or ends may be triangular, arrow-headed, or like arrow feathers, and the propellers may be fixed in the bows, stern, or keel.

[Printed, 4*d.* No Drawings.]

A.D. 1861, April 11.—N° 890. (* *)

BURY, William.—This invention relates to steam engines and boilers, and consists in applying valve boxes to two sides of each cylinder, in which two main slide valves with alternating movements are worked by means of a grooved cam on the crank shaft; the grooves form excentric paths for rollers, which are mounted upon studs fixed in the ends of two levers that communicate motion to the slide valves, thereby alternately opening the steam ports to the piston and exhausting on the opposite side. For marine purposes, by preference, two pairs of cylinders are divided and mounted on the condensers on each side of the crank shaft about 10° above the centre, the piston rods inclining thereto; the connecting rods of each pair work on to the same crank pin. The air pumps are contained within the condensers. The opposite cylinders and condensers are connected together by four side frames which carry the main shaft. Arrangements are made for reversing. The boiler is shown as tubular with three furnaces; the furnaces and smoke chambers are divided by thin hollow partitions, and partially lined to form hollow spaces wherein the steam is superheated as it passes from the steam space in the boiler to the steam pipe of the engine; where necessary, the plates forming the thin steam passages and hollow linings are protected from extreme heat by fire-brick guards or shield plates.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1861, April 19.—N° 966.

RIDLEY, John.—" Improvements in steam generators and " superheaters."

The inventor says,—

" My invention is performed in the following manner:—I first " generate steam by any ordinary known means, and cause the

" steam to pass through a valve into a superheating coil or set of " tubes or other superheating apparatus; the valve is for the " purpose of preventing the pressure of the steam reacting upon " the boiler in which it was generated. Also, while I admit " steam I admit or force water into the coil of tubes or other " superheating apparatus, and apply the steam from the super- " heating apparatus to drive engines, and for other purposes for " which steam is applicable. The quantity contained in the " superheater is sufficient for one stroke of the piston, but need " not be exhausted.

" My invention consists of two parts; first, of a valve or " valves placed between an ordinary boiler and a superheating " apparatus, by which, when the superheater is charged with " steam, the pressure gained is maintained; then by admitting a " limited supply of water with the steam, when the apparatus is " sufficiently heated, a very much increased pressure may be " obtained. The valves are so far self-acting as to close when " the pressure in the superheater exceeds that in the boiler. In " order to obtain this sufficient heat, my invention consists, in " the second place, of an arrangement of pipes in two coils set " vertically with a fire between them, and enclosed by water " spaces." " The coils are continued upwards from the an- " unlar fire space, and extend in a single row, which I arrange " over a cone, the object being to prevent the air admitted " from the top as well from the bottom passing off except " through the fire, where mixing with the gases evolved from the " fuel, their perfect combustion is ensured, and smoke thereby " prevented."

[Printed, 6*d*. Drawing.]

A.D. 1861, April 27.—N° 1064.

MILLER, THOMAS WILLIAM. — " Improvements in steam " engines, and apparatus connected therewith."

Steam engines for screw propellers are made with three cylinders, one of which is to be of less dimensions than the other two, and " of a length only sufficient to give a stroke or travel of " piston equal to the proportion of the wheel gearing introduced " between the crank shaft " of the large engine and that of the small one. In horizontal screw engines the small cylinder is placed above and between the large cylinders, and the wheel gearing between the axial lines of the large cylinders. The steam from the small cylinder passes to the larger cylinders and then to the condenser.

For communicating motion to screw shafts a pinioned shaft "formed by the teeth being planed out of the solid" is used. The wheel gearing into this shaft is made of "several gun metal "wheels secured side by side," or is "a hollow drum-like casting "with a boss at each end."

"The pinioned shaft and the driven wheel into which it gears, "are to be mounted in a frame or carriage composed of one "casting, having a guide standard at each end, in which the two "sets of shaft bearings are fitted, and thus the constant "parallelism of their axes may be secured. The short length of "driven shaft upon which the wheel is mounted should be "connected to the line of screw shaft by means of a flanged "coupling or disc." This method of transmitting motion is particularly suitable for engines working at high velocities.

For a surface condenser, a casing is formed, with "a central tube "or passage for the admission of the exhaust steam at its top, "and its conduct to the bottom chamber or below the tube "plate." A number of tubes have each "its superior end closed "and the lower ends secured in the tube plate, whilst the upper "end is free to admit of expansion and contraction. The cold "condensing water is admitted at the lower part of the casing, "circulates among the tubes, and escapes at the top or superior "end of the condenser casing. The casing is supported upon a "chamber into which the steam passes, and in which the condensed steam from the interior of the tube falls, and the hot "fresh water is collected for the purpose of feeding the boilers."

The casing of the condenser may be surmounted with "an "additional vessel or casing containing a series of tubes closed "at their superior extremity and passing through a tube plate "forming the bottom of such vessel." The steam on its way to the condenser enters these tubes and is partly cooled. The water from the pumps on its way to the boiler passes through this case. A similar chamber may be filled with ether, which is vaporised by the heat of the steam, and passes to a vapour condenser, where it is again reduced to the liquid condition and returned to the chamber. The tubes above described may be *double instead of single*, and bent so that both ends are secured to the plate. They may have a metal partition in each reaching part of the way up.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1861, May 3.—N° 1118. (* *)

HUMPHRYS, EDWARD.—(*Provisional protection only.*)—This invention, relating to machinery for steam vessels, "has for its " object improvements in the application of hydraulic pressure " on board steam vessels, and consists, first, in applying a cylin- " der fitted with a piston or plunger so arranged as to cause the " pressure of water or other fluid on the piston or plunger to " give motion to the valve gearing, in order that the stopping " and starting of the engines of steam vessels may be effected by " such motion; second, the application of a cylinder fitted with " a piston or plunger so arranged as to cause the pressure of " water or other fluid on such piston or plunger to give motion " to a rope or chain, whereby the cargo of, or coal for a steam " vessel may be hoisted in or out of such vessel; and, third, the " application of a cylinder fitted with a piston or plunger so " arranged as to cause the pressure of water or other fluid on " such piston or plunger to give motion to the chain cables of " steam vessels, so that their anchors may be raised by such " motion, and the cables worked as required."

[Printed, 4*d.* No Drawings.]

A.D. 1861, May 9.—N° 1175.

BURCH, JOSEPH.—"Improvements in constructing and in " machinery or apparatus for propelling ships and vessels."

The invention consists "in forming the lower portion of the " after or buttock parts of ships or vessels of iron or metal, the " other parts of which are intended to be of wood or other " material. The parts so constructed of iron are for the purpose " of fitting therein the boiler and machinery, and thereto the " propeller, rudder post, and other parts.

"It also consists in the mode of uniting the iron and wood, or " the two materials thus used, in the construction of ocean, " river, and canal steamers by means of lap joint, and angle or " curved iron attached thereto.

"It also consists in the mode of arranging and fixing the " boilers and machinery for propelling vessels entirely in iron or " *metal sterns.*

"It also consists in the peculiarity of the form of such iron
" sterns when attached to vessels which are intended for inland
" navigation, so that although below the water, the run is narrow,
" the breadth and bearing on the surface is nearly equal to the
" full width of the vessel to which they are to be attached.

"It also consists in the mode of applying an auxiliary screw
" propeller to vessels ordinarily used as sailing vessels by a frame
" and joint for the purpose of raising and lowering it at the
" stern to its proper position when in and out of use.

"And it also consists in the use of blades or fins made entirely
" of malleable metal, and in fitting them into oblique narrow
" slots formed in the central part of propellers, there to be held
" by a single screw, key, or bolt, in order that they may be
" quickly removed when the vessel is required to go under
" canvass alone, or changed when broken or disabled when the
" vessel is under weigh or afloat, without removing the central
" part of the propeller from the propeller shaft."

[Printed, 10*d.* Drawings.]

A.D. 1861, May 11.—N° 1201.

JONES, GEORGE FOWLER, and JONES, JAMES.—(*Provisional protection only.*) — "An improved method of propelling and " steering steam vessels, and for a casing about the apparatus, " constituting therewith a steam condenser."

When a propeller is a surface in the form of discs, floats, or blades partly or wholly submerged, the casing is to be furnished with tubes, and used as a condenser. When not thus in use, air being pumped in will partly expel the water.

A revolving disc propeller on a vertical axis has a shield adjustable for steering purposes, and protecting flanges between the discs, which as they revolve will cause a partial vacuum in the shield and aid the propeller.

[Printed, 4*d.* No Drawings.]

1861, May 11.—N° 1205.

CLARK, WILLIAM. — (*A communication from John Theodore Scholl.*)—" Improvements in the construction, ventilation, and " propulsion of life-boats."

A boat made either "collapsible or non-collapsible" is described. It has a *platform* swung so as always to remain level, however much the boat may roll. The fourth part consists "in "propelling the collapsible boat by means of rods or cranks "placed between the seats, and so connected with oars, or a screw "propeller, that every passenger can assist in advancing the "boat, for which purpose cross rods, passing between the seats, "are connected at their ends to angular blocks, also connected so "as to form a sliding frame, which is to slide in the slots of the "longitudinal bars connected to the revolving platform before "mentioned; this frame is connected by levers to two bent rods, "which are further connected by jointed levers to a pair of oars, "each constructed of a plate of metal rectangular in outline, "and divided into two unequal parallelograms. By working the "rods between the seats forwards and backwards, the oars are "moved, at the same time acting only one way, it being all "the same whether the boat be revolving or not. The non-collapsible boat is propelled by means of several cranks placed "between the seats of the boat, having their bearings in the longitudinal bars before mentioned, and connected in the middle by "a long connecting rod to a crank and bevil gearing for working "a propeller. When the sea is calm and the wind favorable a "mast may be raised, and a sail or two unfurled."

[Printed, 1*s*. Drawing.]

A.D. 1861, May 20.—Nº 1288.

PAPENGOUTH, Oswald, and LEHMANN, Laurenz Ignatz.—"Improvements in propelling vessels, and in apparatus for the same."

The plans proposed are—

(1.) Plungers moved to and fro under water through cylinders, are driven from the pistons of steam cylinders, so as to act upon the water and propel the vessel. (2.) Duck-feet propellers contracting for the return stroke, are driven by a wheel and rack.

[Printed, 8*d*. Drawing.]

A.D. 1861, May 31.—Nº 1368.

BEAUCLERK, Lord Charles.—(*Provisional protection only.*) —"Improvements in apparatus for propelling vessels."

"The invention consists of eight cranks about six feet long (or "any given number of cranks) set at an equilateral triangle to "each other, and fixed to two angles resting on suitable bearings

" which pass through or into the vessel, and are placed parallel " to each other; these cranks are to be coupled together by " double coupling rods about 18 feet long and 3 feet apart; on " these rods are placed four floats (more or less) say 3 feet by 4. " The axles are worked round by steam power within the vessel, " and give rotary motion to the three sets of coupled cranks " without. When in motion it is obvious that each pair of " coupled cranks will carry the floats fixed to the rods into, " through, and out of the water at right angles to the vessel, " and will always remain parallel. It is obvious also that each " set of floats is lifted out of the water and replaced in quick " succession by the other two, it follows then that eight floats " are always out of the water and four in; thus at each complete " rotation of the axle, each float has performed a revolution of " 12 feet diameter; the measurement of each float being 3 feet " by 4, gives a surface of resistance of 48 feet, thereby doing " the work of four ordinary paddle wheels, independent of the " advantage derived from direct action, large size and great " depth of float, to which may be added slow speed of engine " and low paddle box."

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 3.—N° 1389.

TOWL, John.—" Improvements in propelling vessels."

The invention consists " in the use of a disc with a set of " curved blades on each side of it, such disc being enclosed " within a case, in which are formed orifices at the centre, and " also at the bottom, communicating with passages for water " one half of such passages opening towards the bows of the " vessel, and leading to the centre of the case, and the other " half opening towards the stern thereof, and leading from the " bottom of the case. By this arrangement, in propelling the " vessel forwards the water outside the vessel will be made to " enter the passages on each side thereof opening towards the " bows, and pass to the centre of the case so as to maintain a " supply of water in the case for the curved blades of the disc " to act upon, such water being driven by their action through " the outlets at the bottom of the case, and thence through the " passages leading to the orifices opening towards the stern of " the vessel. In backing the vessel the water is made to enter

" at the passages opening towards the stern, to pass into the case " at the bottom, and issue therefrom at the centre, and to be " discharged through the passages leading to the orifices opening " towards the bows of the vessel."

[Printed, 10*d.* Drawing.]

A.D. 1861, June 8.—N° 1463.

O'HANLON, PATRICK.—" Improvements in marine and land " steam boilers."

The inventor describes his invention as applied to the " ordi- " nary marine tubular boiler " in the following words :—

" Instead of conducting the currents of heat and smoke from " over the bridge at the back of the grate into the smoke cham- " ber, I either close or partially close up the space between the " roof of the respective fire-boxes and the bridge, and cause the " current of heat and smoke before reaching the before-named " smoke chamber, to pass through an intermediary passage " through a series of tubes and flues, whereby the above speci- " fied increase of heating surface is realized; these intermediary " tubes or flues, as I may term them, I place, by preference, in " that especial boiler to which this description appertains, imme- " diately above the fire-boxes extending from the front of the " boiler to the primary smoke chamber, with which they are in " connexion. The tubes are connected with the fire-box by " a series of vertical or inclined smaller tubes or flues, which " serve at the same time to keep the intermediary flues in their " position, and to stay them. In addition to this, should it be " necessary, I place a plate transversely across the intermediary " tubes or flues in order still more to connect the whole sub- " stantially together. The direction the currents of heat and " smoke take is as follows :—The heat ascends directly from " the grate in a vertical direction into the intermediary tubes or " flues, whence it finds admission into the primary smoke cham- " ber; from here it passes, as in the ordinary boilers, through " the tubes into the secondary or front smoke chamber, and " thence into the funnel. The arrangement of the additional " flues has the advantage of being easily cleared out from the " front of the boiler, where the intermediary tubes may be closed " by suitable doors or covers. By my improved arrangement the " hot currents are caused to enter the smoke chamber through

" the top of the fire-boxes through a series of openings, whereby
" the currents entering the openings placed more forward are
" made to pass over these openings placed more in the rear,
" thereby causing the combustion of the denser particles of the
" said currents. Should it be found that there is more area in
" the back branch tubes than is necessary, and in order to ascertain the proper area, I propose to use a hollow cone of metal,
" with the apex removed, to constructed as to rest on the top of
" branch tubes, where they enter the horizontal tube or flue.
" For instance, should the heat escape too freely through the back
" branch tubes by introducing cones larger or smaller, as may be
" required, the heat may be thrown to the front branch tubes,
" and thereby a proper regulation of heat may be arrived at."

[Printed, 8*d.* Drawing.]

A.D. 1861, June 10.—N° 1472.

ARMSTRONG, Robert.—" Improvements in marine steam
" boilers, parts of which improvements are applicable to other
" steam boilers, and in apparatus connected therewith."

The first of the improvements is to prevent priming. A perforated shelf or bracket is made to project from the side of the boiler " a few inches below the surface level of the water, and
" extending over the width of the water spaces between the
" flues."

2. For the same purpose a " series of scum pans of an improved
" description having serrated or vandyked edges " is used,
" adjustable to any variation in the water level by means of
" a screwed rod," with a handle outside the boiler.

3. A " mud receiver " is connected by a pipe from the boiler, through which the water circulates, and deposits its sediment in the receiver. It may be blown out by an arrangement of stopcocks.

4. A lining of oak-staves is arranged inside the boiler shell, to prevent " calcareous scale." This lining is fixed on a rack, and is removeable.

5. Two cylindrical boilers of the vertical class, having vertical fire-boxes within them, are attached by flues below the surface level of the water, and passing through the outer waste space between the fire-box and the shell of the boiler. The products of combustion pass from one fire-box through the flues to the

second boiler, and thence to the chimney. Sometimes a third similar compartment may be added.

6. Hollow stays, through which the water circulates, are fixed across the fire-box. These stays are elliptical, with their longer axles vertical at the ends, but horizontal in the middle.

7. For superheating steam, a series of similar stays are fixed in the funnel, the lower part of which is encased in a jacket.

8. To heat and purify the feed water, a tank is placed below the boiler, upon the top of which the flame from the furnace reverberates. The water from this tank overflows into a second tank, and the sediment collects in the first tank.

9. To prevent black smoke from the funnel, two jets of air are injected from opposite sides into the furnace, so that they may mix and prevent "blow-pipe action" on the material of the fire-box.

10. The fire-bars are thicker at one end than the other, and alternate. The thick ends are supported by a moveable transverse bar, so that the space between the bars can be varied. The arrangement may be self-acting.

[Printed, 1*s*. Drawing.]

A.D. 1861, June 18.—N° 1557.

WALKER, ROBERT.—" Improvements in propelling vessels."

A flexible blade fastened at one end to a rod, is moved backward and forward, or up and down, or in an angular direction about an arc, either by engine power, or by the agitations of the waves, and the bending of the blade causes part of its action to propel the vessel.

Several such blades may be set in a frame, and the fastened end is to be fixed in a gudgeon which can be set as desired for backing the vessel, as well as for propelling her ahead.

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 24.—N° 1614.

MOORE, ROBERT.—(*Letters Patent void for want of Final Specification.*) —" Improvements in the construction, steering, and " propelling of ships and other floating bodies, and appliances " adapted thereto."

The first and second parts of the invention relate to the construction and steering of ships. The third part is thus *described:—*

"The third part of the invention consists in the adaptation of " one or more adjusting frames, moveable in a vertical direction " at the stern of ships propelled by helical paddles or screws of " any kind whatever, for the purpose of permitting the propeller " to be driven by direct shafting, or by gearing with variable " immersion irrespective of the ship's load line. For this purpose " I use a sternpost, having a slotted opening cut for the vertical " movement of the screw shaft, or rolled, or forged, or fashioned " partially or otherwise with the parts rivetted, bolted, or otherwise fastened together, so as to admit of the desired movement; " otherwise I employ a stern-post formed of one or more pieces, " with two or more suitable openings for independent shafting, " but in the latter case the adjusting frame is somewhat different " in form and action from the preceding. However, any competent mechanic can understand the the essential details of construction for such frames without special description from this " indication, that the lift in the former arrangement must act " with equal effect on the moveable portion of the shaft, on the " screw and bearings, and also on the rudder astern, all if desired, " when the latter is moveable, whereas in the latter the lift is " principally on the screw and rudder astern, if any, and moveable. In regard to this I disclaim the right to any modification " of the screws or other helical propellers, or to any mechanism " for shipping or unshipping the same, which have been already " used or patented, or to any special utilization or regulation of " any motive power, my claim being confined to the adjusting " frame or frames in combination with the stern-post or posts " and independent shafting, as herein-before described."

The fourth part relates to an improvement in pumps.

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 25.—N° 1621.

CLARK, William.—(*A communication from Paolo de Scalzi.*)—" Improvements in apparatus for propelling vessels."

Paddle wheels turning horizontally on vertical shafts, are so placed under water at the sides of a vessel and partly within it, as to be cased in, except the outer arcs of the circles in which the paddles act upon the water to propel the vessel.

[Printed, 6*d*. Drawing.]

A.D. 1861, June 27.—N° 1643. (* *)

McNAUGHT, William.—This invention relates particularly to direct acting condensing steam engines, of the diagonal class, with either one, two, or more cylinders, and such an arrangement of framing, that all the usual stone foundations are dispensed with, the engines being attached, and depending for stability upon the "side walls" of the engine house. By bolts and other convenient means, the engine framing is fixed to the "side walls," which are tied together by transverse beams of iron or other material; these beams assist to support or carry the engine, the air pump and condenser being attached thereto; vertical stays and tie beams are provided to secure the transverse beams, four of which are shown, but a greater or less number may be required; the stays may be used as fixings for the guides of a third cylinder, or for the air pump, if worked direct from the crank pin. For running at a high speed, two or more smaller air pumps worked by excentrics may be used to mitigate and divide the shock. Similar arrangements are suitable for high-pressure and for oscillating marine engines.

[Printed, 10*d*. Drawing.]

A.D. 1861, July 6.—N° 1715.

DEAN, John.—"Improvements in machinery or apparatus for "propelling vessels."

The paddle floats are arranged in sets of four, upon cylinders which can turn in the rims of the framework of a large wheel as a paddle wheel frame. As each cylinder is about to descend into the water up to its axis, the lower float is caused to assume a vertical position, which it maintains during its course until it leaves the water.

This feathering action of the floats is obtained by drums upon the axes of the cylinders and cogged rims acting upon them.

[Printed, 8*d*. Drawing.]

A.D. 1861, July 12.—N° 1757.

ADAMS, William Bridges.—"Improvements in locomotive "engines and trains."

The cross-head of the piston rod is connected to lateral slides outside the cylinder, and parallel to the piston rod, so that the *ordinary slides* are dispensed with, and the connecting rods attached to the slides "at or near the plane of the piston," so that the cylinder is brought nearer the driving wheel, without shortening the connecting rod. The piston may be connected directly to the slides "through open lateral slots in the side of the cylinder," so that the piston rod may be dispensed with, or it may be connected to the slides "by the cross-head forming part of the slide." The piston rod may be excentric. These arrangements may be applied to marine or fixed engines.

To heat the boilers, oil or inflammable liquid is dropped on the burning fuel. Air is admitted below through suitable openings.

[Printed, 1*s*. Drawings.]

A.D. 1861, July 19.—N° 1823.

BROOMAN, Richard Archibald.—(*A communication from Eugene Coulon.*)—"An improved method of propelling ships and "other vessels by means of superheated steam."

Dry or superheated steam is discharged under water through tubes, so as to propel the vessel.

[Printed, 6*d*. Drawing.]

A.D. 1861, July 23.—N° 1849.

CLARK, William.—(*A communication from William Lighthall and Albert Nicholson Chrystie.*)—(*Provisional protection only.*)—"Improvements in apparatus for the condensation of steam in "marine engines, and in the particular application of parts "thereof to the ship."

The injection water is cooled by being passed amongst tubes to which the sea water has access. The water is admitted to these tubes "by the motion of the vessel" at the bows, and passed out at the stern. There is also a self-acting apparatus for regulating the supply of water to be returned to the boiler.

An improved refrigerating apparatus is described which consists of capped tubes and metal diaphragms and partitions to promote circulation of the water. The external openings of the tubes employed have gratings.

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 24.—N° 1851.

HUGHES, Thomas.—"An improved steam generator."

A base plate has a hole in the centre with a flange. Into this hole is fixed a tube. About half way up the tube are bosses to which are screwed tubes communicating with the interior of the central tube. These tubes are spiral, and the axis of the spiral is parallel with the centre tube, into which they again enter at its top. There is thus one main tube surrounded and in connection with several spiral tubes. At the top is a steam-chest, and the furnace is arranged below. Water is admitted at the bottom of the central tube, and flows through it and the spiral tubes. The products of combustion pass on the outsides of the spiral tube, and between them and the central tube.

[Printed, 10*d*. Drawing.]

A.D. 1861, July 27.—N° 1882. (* *)

HARFIELD, William Horatio.—" Improvements in con-" structing and propelling ships and vessels."

" For these purposes, in order to use a paddle wheel in the " centre line of a ship or vessel, and to work in a close case in " water, the surface of which is at a lower level than the surface " of that in which the vessel floats, the bottom of the ship or " vessel is to be built with a hollow groove or inverted trough " from end to end thereof. The sides of such inverted trough " or groove are preferred to be upright and parallel, and of a " depth somewhat less than to the water level in the paddle-" wheel case. This inverted trough is constructed with suitable " metal framing and plated with metal plates, in like manner to " that in which iron ships or vessels are now built. On each " side of this inverted trough or groove a keel may be formed. " Intermediate of the length of this inverted trough or groove is " constructed an air and water-tight chamber of suitable dimen-" sions for receiving the paddle wheel. This air-tight chamber " is open at bottom and closed at top, there being, however, a " man-hole capable of being closed air-tight at the top, in order " to admit of persons getting, when necessary, into the paddle-" wheel case or chamber. This paddle-wheel chamber or case is " constructed with metal framing, and plated over in like manner " to that practised in building iron ships or vessels. By thus " constructing a ship or vessel with a hollow groove or inverted " trough of metal along the bottom, and a chamber for the " paddle wheel of metal, great strength in the construction of a " ship or vessel may be obtained. The paddle-wheel shaft turns " *in bearings* supported at the sides of the chamber or case, and

" the shaft or axis passes through stuffing boxes into the interior " of the ship or vessel, in order that the air in the chamber may " not escape, and that when the water is allowed to rise in the " paddle-wheel case to a level corresponding with the line of " floatation of the ship or vessel, the water may not pass into the " ship or vessel, as in many cases the paddle shaft will be below " the level of the exterior water. The paddle wheel used has " feathering floats or paddles." "When at work, the air in the " paddle-wheel case or chamber is to be under compression in " such manner that the water may only be permitted to rise into " the chamber or case to such an extent as is most favourable for " the action of the float boards or paddles; for which purpose " an air pump is applied, which being worked occasionally, " will keep the water within the paddle-wheel case at the desired " height."

[Printed, 10*d*. Drawing.]

A.D. 1861, August 2.—N° 1920.

TURNER, **Frederick William**.—(*Provisional protection only.*) —"Improvements in apparatus for obtaining and applying the " motive power of steam."

Steam is admitted at a suitable pressure to one end of a cylinder which is immersed in a vessel of water, and has free communication with it. "Truncated cone pieces" are placed with the larger end "in the rear of the steam jet." Within the cylinder is an axis traversing it; on it are several screws. Between the screws screw blades are fixed to the sides of the cylinder. To propel vessels, the cylinder is placed on the stern and a screw propeller fixed to it. The inside of the cylinder has free communication with the external water. The steam when injected acts on the screws and rotates the axis, the action being aided by the water in the cylinder.

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 3.—N° 1932.

O'HANLON, **Patrick**.—"Improvements in marine and other " steam boilers with reference to economy of fuel."

The inventor says:—

"The improvements herein-after described are especially applic- " able to my improved marine and other boilers, to which Letters

" Patent have been granted to me. Number one thousand four " hundred and sixty-three, bearing date the eighth day of June " one thousand eight hundred and sixty-one, but may also be " adapted to other descriptions of boilers. The economical con- " sumption of fuel to which this Patent relates, I propose to effect " by two means, namely, on the one part, by causing through " mechanical and artificial contrivances a more perfect combus- " tion; and on the other part, by conducting the water for feeding " the boiler in such a manner through the flues as to become " thoroughly heated, but without abstracting by such process any " heat which would otherwise have contributed to the heating of " the boiler.

" In order to effect the first part of my improvements, namely, " a saving of fuel by a more complete and regular combustion, " I introduce into the mouth of each of the intermediary large " tubes or flues (situated above the respective fire boxes, and con- " nected with these by a series of smaller tubes as described in " my Patent herein-before mentioned) a kind of fan or exhauster, " which, by virtue of the air or gases becoming more rarified on " the one side than on the other by the heat, will rotate, and " by so doing transmit the smoke in a regular manner into the " smoke box of the boiler. These fans will consist of a series of " blades fixed to a spindle passing through the ends of the flues " or tubes where, joining the smoke chamber, their form will be " adapted to the circular shape of these flues. When the fans " are inserted in the intermediary large tubes, the mouth of each " large tube will be closed, with the exception of leaving an " opening on the bottom of each tube for the purpose of admitting " air for the rotation of the fans. The size of this opening may " be varied at the discretion of the engineer.

" With respect to the second part of this Invention, I propose " to omit the fans (above-described) in the two intermediary tubes " or flues which are respectively situated the nearest to the sides " of the boiler, and introduce, in lieu of them, the feed pipe, " which, being of a smaller diameter, would leave space enough " for the smoke and gases to pass into the smoke chamber. The " course the feed pipe takes is, therefore, the following:—First, " it enters the boiler at the front, passes through the wing tube " before mentioned at one side, traverses the smoke chamber at " *the back,* and repasses finally through the other wing tube "at the opposite side again to the front of the boiler, where with "a bend and a valve or cock it is in communication with the water "space."

[Printed, 8*d*. Drawing.]

A.D. 1861, August 14.—N° 2017.

RIPPINGILLE, Edward Alexander.—"Improvements in "steam engines."

"This engine is for the purpose of utilizing the power of the "injection water as it is forced by the atmospheric pressure into "the condenser, and is applicable to all jet-condensing engines.

In constructing this engine a cylinder closed at both ends is employed "with piston working in the same, having its piston "rod coupled to work simultaneously with the air pump piston; "passages communicating from the valve chest admit the injection "water to one or both ends of the cylinder, and from the cylinder through the eduction port into the condenser communicating "with valve chest in the supply pipe for the injection water, "which must be of equal area to the area of ports of the engine; "the valve or valves is or are worked by" a loose eccentric, "which would require no supervision in reversing the engine. "The size of the injection engine is regulated by the size of the "air pump; in single-acting engines the diameter of the injecting engine should not be more than half the area of the air "pump; in double-acting engines, one-fourth the area. The "valve ports and eduction passages must be in size in proportion "to the speed of the engine, from one-fourth to one-tenth the "area of the injection cylinder. It is desirable in arranging and "connecting this engine to place the injection cylinder as near "the condenser, as practicable, and elevated above it, that the "water from injection cylinder may have no obstruction in its "passage to the condenser.

"The injection engine must act simultaneously and identically "with the piston of the air pump, and for this purpose" the piston rod of the injection engine is connected "to corresponding "moving parts of the air pump, and where practicable in marine "engines the injection engine may be situated over or in a line "with the air pump, with the piston rod coupled to the air pump "rod, having sufficient room between to admit crosshead coupled "to the end of *single lever*, with connecting rod from the lever

" working on to the crank on the main shaft, where convenient, " a connecting rod carried from crosshead direct to the crank or " other moving parts of the engine."

[Printed, 4*d.* No Drawings.]

A.D. 1861, August 15.—N° 2028.

LEBAUDY, Adolphe.—(*A communication from Jean François Cail.*)—(*Provisional protection only.*)—" Improvements in towing " vessels or boats on rivers."

One or more chains laid along the bottom of a river or canal may be passed over drums on a vessel's deck, and by the rotation of these the vessel may be towed.

[Printed, 4*d.* No Drawings.]

A.D. 1861, August 15.—N° 2041.

CHATTERTON, Richard Dover. — (*Provisional protection only.*)—" Improvements in transmitting motive power, especially " applicable to piston propellers."

Plungers or piston propellers working directly on the water are to be moved by cams upon a wheel. The return stroke is made by the action of the water, or springs may be used. Intermediate levers may be applied.

[Printed, 4*d.* No Drawings.]

A.D. 1861, August 19.—N° 2056.

SELBY, George Thomas. — " An improvement in surface " condensers."

The " invention consists in making the tubes of condensers " of a spiral or worm form for the whole or part of their length " instead of straight, as heretofore. The spiral or worm form " will admit of expansion and contraction in the length of the " tube without affecting the joints, where the ends of the tubes " are fixed tight and fast in the plates or sides of the cistern of " the condenser."

" The supply of cold water may pass through the condenser " cistern, and the steam through the spiral tubes, or the water " may pass through the spiral tubes and the steam through the " cistern and among the tubes, as may be preferred. Again, the " spiral tubes may be connected together by the ordinary steam " *or gas tube* fittings, instead of being fixed in the sides or ends

" of the condenser, as described. The spiral tubes are made of " copper, brass, iron, or other metal."

[Printed, 10*d*. Drawing.]

A.D. 1861, August 22.—N° 2095.

MAHON, Arthur Irwin.—(*Provisional protection not allowed.*) —" Improvements in screw or spiral propellers, also applicable to " raising and forcing water."

" This invention consists in having the blade, of whatever " form it may be (screw or otherwise), so constructed or arranged " that it shall strike the water, while working at any angle that " may be desired, throughout its extent, and irrespective of its " pitch; and also that spaces being left next the parts of the blade, " placed angularly, water may pass freely through all parts of said " blade, and will be held within the perimeter of disc formed by " revolution of blades. Spiral may of any length, and blades " may be held by cylindrical construction in position, if necessary, and work forward with before described arrangement on " reversing spiral. Water may be taken in freely all through " length of spiral, as well as at either end, and discharged at " either end as may be desired. Screw may be worked in any " position with regard to a vessel that the common screw works, " or in centre of vessel, and water taken either from bow or side " to work it, or it may be in a channel beneath the vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 26.—N° 2119.

MENNONS, Marc Antoine François.—(*A communication from Pierre Louis Timothée Thier.*)—" Improvements in the propulsion and steerage of ships or vessels, and in the construction " and arrangement of the machinery connected therewith."

Two openings in the bows lead to a " canal," which passes through the ship. In this canal are pallets worked by a wheel which drive the water backwards, " thus dissipating the gathering " ahead, and filling up the depression astern." Various modifications of this principle are given. Instead of a paddle wheel, the same effect may be produced by a force pump, with valves in the canal, to draw the water from the bows, and eject it astern, or by a turbine, or by a screw.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1861, September 9.—N° 2246.

SIMONS, WILLIAM.—"Improvements in constructing ships or "vessels."

The only part of this invention relating to marine propulsion, is the seventh, which consists in "constructing and placing of "side paddle wheels so that their floats shall draw more water "than the vessel, or project down several inches or feet below the "line of the vessel's bottom or keel." "Also the making of "metal paddle floats with flanges or ribs upon their acting face, "or with a thwartship curve, or of such a shape as to present a "zig-zag section, that is having angulated or circular corru"gations."

[Printed, 3*s*. 2*d*. Drawings.]

A.D. 1861, September 9.—N° 2249.

FRYER, ALFRED.—"Improvements in propellers, and in pro"pelling vessels through water."

A framework at the end of a horizontal piston rod moves back and forward under water outside a vessel and carries floats, hinged so that they feather and assume an inclined position for the return stroke.

Various modes are described for reversing the action when the vessel is to be backed, by means of stops acted upon by a central rod through the piston rod, which may be turned into any desired position by the engineer.

[Printed, 1*s*. Drawings.]

A.D. 1861, September 13.—N° 2278.

FELL, RICHARD.—(*Provisional protection only.*)—"Improvements "in compressing and rarefying atmospheric air with machinery "for applying the same to create a motive power, part of which "is applicable for cooking purposes." The inventor describes his invention, as applied to the propulsion of vessels, in the following words:—

"Over a furnace I place an air chamber, by preference cylin"drical, and between it and the furnace I mount a series of tubes "provided with inlet and outlet valves, connected to and free to "revolve on a central shaft. A cold water cistern is placed "*under the furnace*, through which the aforesaid tubes pass as

" they revolve. As the tubes descend, a partial vacuum is " obtained in them, but as they ascend, the air contained in them " is expanded, and admitted into the air chamber over the " furnace, where it becomes compressed. For some purposes " the air is now sufficiently compressed, but where great power " is required, I employ another vessel containing cold water, and " fitted with two or more air-tight condensers. There is a coiled " pipe or worm in this vessel for leading the air from the air " chamber over the furnace into the condensers, whereby the " water contained therein is forced and made to act in the driving " cylinders. The cylinders contain collapsing pistons opening to " the external water. The end of the cylinders is fitted with a " sluice valve or valves; the piston rods are connected to cranks " on the driving shaft of the air cylinder.

"As the piston becomes expanded it draws in with it the " external water, and in collapsing forces the water back again, " and thus the vessel is propelled. I make use of two or more " cylinders, in one or more of which the piston is expanded, and " in the other collapsed."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 16.—N° 2309.

SKINNER, Arthur Maccregor. — (*A communication from Colonel Philip Kearney Macgreyòr Skinner.*)—(*Provisional protection only.*) — " Improvements in propelling ships, boats, and " other vessels."

" This invention consists in propelling ships, boats, and other " vessels by means of a new propeller working on a vertical axis " and placed within the timbers, one on each side of the midship " section of the ship. The centre of the propeller is circular, " and solidly constructed of iron and wood with a transverse " opening to admit of an iron or strong wooden blade or float " traversing to and fro; its axle is vertical, terminating in a " conical point working in an iron cup resting on the bottom of " the ship, being placed eccentrically within an immovable " elliptical iron ring above and below, so that as the propeller " revolves on its axis, the blade or float traverses to and fro " through the transverse opening, in consequence of its edges " moving round in contact with the inside of the elliptical ring, " the blade or float acting like an oar in the water."

There are two propellers, one on each side of the ship, and they "are at the centre of oscillation and low down in the ship."

[Printed, 4d. No Drawings.]

A.D. 1861, September 19.—N° [illegible].

SILVER, THOMAS, and MOORE, THOMAS.—*Provisional protection only.*—"Improvements in the construction of and appli-"ances to steam ships and other vessels."

The first and second parts of the invention deal with the construction of the hull, etc.

The third part "consists in the mode of fixing the machinery "and boilers in the side sections of the ships, so as to allow the "whole centre section to be free from appliances connected with "steam propulsion. The paddle-wheel engines will be connected "by a shaft fitted with a pinion on each end, gearing into toothed "wheels on each engine shaft."

The fourth part "consists in the arrangement of the screw "engines, three cylinders to which will be fixed longitudinally, "the centre cylinder to have its piston connected with two con-"necting rods. By this arrangement the centre piston will do "the work of preventing the back-lash, for which two cylinders "are required under the common working of modern engines. "By the arrangement here described each set of engines will "drive two spur wheels, between which a pinion gears carrying "the screw shaft."

The fifth part "consists in working a screw under each "quarter of the stern of the ship, with paddle wheels at the "sides."

The remainder of the invention does not allude to marine propulsion.

[Printed, 4d. No Drawings.]

A.D. 1861, September 24.—N° 2378.

PARKES, JAMES DAVID.—(*A communication from Jean Baptiste Vincent and Martin Louis Goupy.*)—(*Provisional protection only.*)—"Improvements in the propeller of a ship."

A frame with floats hung so as to feather or turn for the return stroke, is moved fore and aft under water by chains over pulley wheels worked by the engine. There is a lever to alter the stops when it is desired to back the vessel.

[Printed, 6d. Drawing.]

A.D. 1861, October 14.—N° 2558.

MACNAB, William.—" Improvements in marine steam engines " and boilers."

The specification refers to engines and boilers of the classes described in a patent dated 26th September 1860, No. 2341.

Two cylinders, a high-pressure and a low-pressure, are placed in one or other of various positions in relation to each other, and the valve motion for the high-pressure is on the piston plan, while that for the low-pressure is an ordinary slide valve, both being in the same chamber. Steam circulates in jacketing about the cylinders by a small quantity of it being caused to emerge and go to the low-pressure cylinder.

The boiler is of a square form below, with a dome above. A furnace space in the interior is surrounded by a narrow water space, and it has within it a pan-shaped water space, or two such spaces, with tubes that hold the water rising and inclined outwards to the roof plate of the furnace. Jets of water may be cast on these tubes to clean them while the boiler is at work. The water circulates from the top or bottom through casings in the side water space, and stay rods strengthen the boiler.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, October 15.—N° 2569. (* *)

NEWTON, William Edward. — (*A communication from Francis Bowes Stevens.*)—This invention, relating to surface condensing apparatus for those steam engines which return the water of condensation to the boilers without mixing with other water more impure than itself, consists, first, in the use of rectangular metal plates horizontally packed above each other a short distance apart by means of packing strips, so that every alternate space shall form a clear passage for exhaust steam, say, from north to south, whilst the intermediate spaces shall form passages for the flow of condensing water from east to west, the two currents crossing in the separate passages at right angles. The cooling plates are made by preference of cast iron or lead stiffened with antimony. When done mechanically, the cooling water is driven through the condenser at a high speed, by means of a rotary or centrifugal pump; 150 feet per minute should be the minimum speed up to 650 feet and beyond as a maximum. In *screw-propeller ships*, this pump may be worked by cog wheels on the propeller shaft. Two or more of these condensers may be combined, and used in connection with an ordinary injection condenser. Second, when used for cooling condensing water, such water is made to flow through several of the rectangular passages successively; whilst in the cooling water passages there is an independent current in each. Third, suitably formed guide plates are placed in the pipes which convey cooling sea water to the passages, for the purpose of equalising and conducting its rapid flow thereto. Fourth, plates or blocks are fixed between the mouths of the rectangular passages, so formed as to divide the cooling water into separate free currents. Fifth, sea water is supplied for cooling purposes to condensers through apertures in a ship's side, arranged in diagonal line one below the other, in order not to weaken the side of the vessel, and forming similar apertures further aloft, for the discharge of such water after it has passed through the condenser. Sixth, the conduction and discharge pipes which convey sea water to and from the condenser, are so arched that a portion of such pipes shall be above the sea level, in order that the condenser may be accessible without the interposition of a valve or stop-cock.

(Printed, [illegible] 4d. Drawings.)

A.D. 1861, October 15.—Nº 2570.

BROOMAN, Richard Archibald.—(*A communication from Charles Alexandre Seraphin Victor, Marquis de la Baume.*)—(*Provisional protection only.*)—"Improvements in the method of and "apparatus for propelling ships and vessels."

A float is hung upon a frame so that it may be vertical when acting on the water, and feather into a horizontal position for the return stroke.

The frame is attached to a bar on the end of a horizontal shaft across the vessel, and the bar vibrates fore and aft in a vertical plane through an angle of about 100°.

The plane of the float is kept vertical by the action of links and chains fixed to levers actuated by the shaft.

(Printed, 1s. Drawings.)

A.D. 1861, October 17.—Nº 2584.

WELCH, William.—"Improvements in marine screw pro-"pellers."

The "invention relates to the position and form of the "spiral curvature and cylindrical surface of the blade or "blades, which instead of varying in their width of surface "shall be of uniform dimensions throughout their entire length, "and the outer or entering ends of the blades instead of maintaining the pitch or passing the axis at an angle, are made "the neutral or vanishing points of the screw, and rotating in a "disc form in a line at a right angle with the axis or parallel "with the midship section of the vessel, while the conjunction "of the blades with the propeller shaft is placed at a right angle "with the opposing end or parallel with the water line, each "blade thus forming a curved cylindrical surface, the ends "crossing at an angle =45°, or both blades combined producing "a true screw, the ends crossing at an angle =90°."

[Printed, 8*d.* Drawing.]

A.D. 1861, October 21.—N° 2626.

PHILLIPS, Joseph Scott.—(*Provisional protection only.*)—"A "new method and apparatus for the propulsion of vessels through "the water."

"Its principle will be manifested by the means of a hoof-shaped "paddle made of metal like the hoof of a calf (or other animal "or the shape of the webbed foot of a duck or other swimming "bird); this paddle is to be applied or affixed to a wheel or "wheels the side of a vessel, or underneath, entirely or in part, "in fact, in whatsoever part of a vessel may be found most "suitable and convenient. The upper or back of the proposed "shape to act as a screw propeller, and the under or open sole of "the hoof as a paddle. And the said hoof screw paddle applied "as affixed to the radius of a wheel, or on long bands as in a "dredging machine if found advisable."

[Printed, 4*d.* No Drawings.]

A.D. 1861, October 29.—N° 2705.

SUCKOW, Edmund, and HABEL, Edward.—(*Provisional protection only.*)—"Improvements in anti-friction mechanism for "receiving the end thrust of screw propeller and other rotating "shafts."

The invention consists in the application of one or two or more pulleys "to receive the end thrust of screw propeller and other

" rotating shafts, which pulleys are placed with their axis in
" suitable bearings at a right angle to the axis of the shaft. The
" peripheries of the pulleys come against a ring collar or other
" surface formed or fixed on the shaft. The edges of the
" pulleys are made half round, and the prepared ring or surface
" on the shaft upon which the pulleys act is made flat, or vice
" versa. Arrangements are applied for traversing the antifriction
" pulleys, so that the contact surfaces can be changed and thus
" uneven wearing prevented. These arrangements may be a
" screw or screws acting either upon the axis of the antifriction
" pulleys or the bearings carrying them, and turned by hand
" when required, or a screw cam or excentric may be employed
" geared with the shaft, so as to receive a slow motion. The
" pulleys may be placed in a box so that they can be wholly or
" partly submerged in oil or other lubricating material."

[Printed, *4d.* No Drawings.]

A.D. 1861, October 29.—N° 2708. (* *)

FURLONGE, WILLIAM HOLLAND.—This invention relates to surface condensing, principally designed for marine purposes, and applied to both condensing and high-pressure steam engines, the water produced by condensation being returned to the boiler. The outer casing of the condenser is a cast-iron cylinder; tube plates are placed near each end, so as to leave small chambers beyond; the space between the tube plates is filled with tubes, through which, drawn by a centrifugal pump, there is kept up a constant current of cold water, which, passing into one end chamber, is there distributed through the tubes, and flows on to the other end chamber, and thence to the pump. The exhaust steam is conducted through a pipe into the body of the condenser, where it plays upon the surface of the water tubes; a pipe conveys away the water of condensation to be returned to the boiler, and another pipe is attached to the condenser for the escape of air to the atmosphere; in the case of low-pressure engines, this pipe is attached to a small air pump. The tubes are made tight in the tube plates by the use of india-rubber ferrules, which act as packings between the pipe ends and the holes in the tube plates, and the tube plates are secured by the pressure all round of large india-rubber hoops, which allow for contraction and expansion.

In screw steamers, the propeller can, if desired, be made to draw the water through the condenser and deliver it near the stern post.

[Printed, 10d. Drawing.]

A.D. 1861, November 5.—N° 2778.

BROOMAN, Richard Archibald.—(*A communication from Alexandre Friedmann and Frederic Emile de Erlanger.*)—"Improvements in steam generators and in furnaces for the same."

"This invention consists in fitting in fire-boxes or furnaces of "locomotive, marine or other steam boilers, an arched or dome-"shaped water vessel, communicating with the boiler for its "supply of water through pipes entering the bottom or lower "part of the vessel, and with the steam space in the boiler "through serpentine pipes carried from the top or upper part of "the vessel.

"The invention also consists in forming an air passage outside "the fire-box or furnace, and in regulating the admission of air "by means of a valve or valves, and causing it to enter both "under and through the fire-bars and fuel, and over the fire. "By preference the fire-bars are formed in two sections; one, that "upon which the fuel is received, is fixed, and the other is free "to be moved by a weighted lever upon an axis upon which it is "pivotted. The furnace door is fixed in the upper part of the "casing which forms part of the air passage, in which a valve is "placed, to prevent any portion of the fuel entering and choking "it. In some cases pipes traverse the crown or dome of the water "vessel, and are wholly or partially opened or closed as required "by a register plate worked by a handle extending outside the "furnace."

[Printed, 10d. Drawing.]

A.D. 1861, November 15.—N° 2878. (* *)

NEWTON, William Edward.—(*A communication from Wellington Lee.*)—"Improvements in steam engine governors." In order to make such governors more sensitive, the balls are made hollow and accurately turned in a lathe; they are then filled with lead or metal of high specific gravity; the centripetal force of the governor balls towards the centre of gyration, does not depend upon the *gravitation* of the balls, but is effected by the weight of a hollow vessel centrally secured to the spindle slide and filled with heavy metal. While the tendency of the centrifugal force of the balls in action is to raise the slide, the weight of the central vessel will be constantly tending to force it down, thus the pressure on the slide is always constant. The pressure exerted by the weighted vessel may be adjusted with great accuracy by adding to or diminishing the quantity of lead until the proper equilibrium is obtained. In marine engines it may be found of advantage to employ a coiled spring instead of the central weighted vessel, and the governor may then be placed in a horizontal position. When it is necessary to accelerate or diminish the speed of the ship, in accordance with the state of the weather, the speed of the governor may be regulated by the use of a pair of cone pulleys.

[Printed, 1s. Drawings.]

A.D. 1861, November 26.—N° 2966.

BRAXTON, Charles George.—(*Provisional protection only.*) — "Improvements in apparatus for propelling and steering vessels."

The inventor says, "I run a shaft from the engine room under the beams and through the stern post; also one from the engine room forward through the stem about two feet under water, and working in contrary directions. On the outer ends of the shaft I fix a paddle with two blades, in form like the blade of an oar, in such manner that it may be taken on and off easily by the crew, as I do not intend the one at the stern should be used except in light winds and in a calm or when the stern one is used for other purposes. In such cases I intend it to steer the ship alone, the engineer to work it and steer the ship in the engine room, receiving orders from the officer of the watch by means of a tube from the deck. In case the ship is short of coals and in a calm, I unship the stern paddle and put on a screw to propel the ship and steer by the bow paddle alone, and for the purpose of driving this screw I attach several winches to the upright under each beam, driving the shaft both above and below, so that any number of men may heave by several handles to take off and on at any part of the ship; this I intend principally for sailing ship and transports,

" Boats also may be propelled by the same means, the handle " working between each thwart."

[Printed, 4d. No Drawings.

A.D. 1861, November 28.—N° 2998.

COOKE, WILLIAM, and SQUIRE, FRANCIS.—(*Provisional protection not allowed.*)—" An improved construction of paddle wheels " for vessels propelled by steam or other motive power."

The " invention consists in so adjusting the plates, that instead " of entering into and rising from the water at certain angles " they have a perpendicular action, and thus avoid the usual " surge or back water."

[Printed, 4d. No Drawings.]

A.D. 1861, December 12.—N° 3120.

JOBIN, JOSEPH DOMINIQUE.—" Improvements in locomotive " engines, parts of which improvements are also applicable to " marine and stationary engines."

(1.) The driving wheel of a locomotive is geared with the piston rod by a clutch so that it may turn free when the clutch is loosened.

(2.) The piston packing is formed of segmental pieces pressed outwards by springs between a disc fixed to this piston rod, and another parallel disc adjusted by screws.

(3.) The backs of the slide valves have packing pieces kept up to the working face of the top plate of the valve by springs, so that the sticking of the polished surfaces in contact is avoided.

(4.) Clock springs or volute springs are used for the lever of the safety valve, and is to be wound up to the proper tension.

The heads (2), (3), and (4) are applicable to steam engines in general.

[Printed, 10d. Drawing.]

A.D. 1861, December 13.—N° 3132.

PADLEY, SYLVANUS.—(*Provisional protection only.*)—" Improvements in paddle wheels."

Each paddle float turns on its axis, and is feathered by a stud on its crank arm, which moves in an excentric groove in a disc placed inside the inner wheel rim.

[Printed, 4d. No Drawings.]

A.D. 1861, December 20.—N° 3187.

STANDFIELD, James, and STANDFIELD, John.—(*Provisional protection only.*)—" Improvements in machinery or appa-
" ratus for giving motion to ships and machinery and for raising
" water."

A shaft is caused to rotate by the action of water upon a turbine, and the motion is communicated to screw propellers.

Water is forced to move by steam jets in the middle of tubes through which water flows.

Water ejected through tubes is used for propelling a vessel.

[Printed, 4*d.* No Drawings.]

A.D. 1861, December 20.—N° 3194.

TIPPLE, William.—" Improvements in paddle wheels for the
" propulsion of ships and other navigable vessels."

Paddle floats turning on their own axes are so hung and weighted as to be kept vertical after entering the water and during their passage through the lower arc of their course.

[Printed, 8*d.* Drawing.]

A.D. 1861, December 21.—N° 3207. (* *)

GRIMALDI, Filippo.—This invention of rotary boilers relates to, and is supplemental to his former invention for the " instanta-
" neous generation of steam," described in the Specification of Letters Patent dated August 9, 1860, N° 1927. It consists in internally fitting the rotary boiler with fire tubes, only leaving space for the steam and feeding pipes; or with four flues rectangularly placed round the centre of rotation; these flues may run straight through the centre of the boiler, or they may have
" one of their ends bent inside the boiler so as to open in the
" circumference of the same."

The steam is taken as nearly as possible from the top space in the boiler, while the latter is rotating; the steam pipe enters through one of the trunnions, and bends upwards inside the boiler to within a short distance of the top. In those boilers which are fitted with tubes or flues, several radiating pipes are arranged inside the end of the boiler, which all open into the trunnion, into which the steam pipe is fitted steam tight; a passage into the steam pipe communicates separately with the radiating pipes as they successively come round to a vertical position above the trunnion, when the steam escapes for use.

By means of a tie rod inside the boiler, the steam and feed water pipes, which enter through the opposite trunnions, are connected so that the pressure on one pipe shall counteract the pressure on the other. The safety valves and steam gauge, when there is no steam reservoir, are fitted on the steam pipe near the boiler. The water and steam gauge pipes enter through the trunnions within the steam or feeding pipes.

A movable perforated plate within the boiler is made to scrape calcareous deposits from the outer surfaces of the tubes.

The trunnions which support the boiler rotate on antifriction rollers fitted in the bearings.

It is arranged within the furnace, that the flaming gases shall first play all over the external surface of the boiler below the water line, and then course through the tubes or flues to the smoke chamber and chimney.

Marine boilers are enclosed in casings lined with fire-brick.

[Printed, 10*d*. Drawing.]

A.D. 1861, December 21.—N° 3209.

ALLCHIN, WILLIAM LOADER, and ALLCHIN, WILLIAM.—" Improvements in apparatus applicable to the superheating of " steam."

For portable boilers, a series of "syphon" tubes is placed in the smoke-box and connected to the boiler as well as to a pipe leading to the cylinders. A D-shaped chamber, with an inner and an outer casing, between which the steam is contained, is also used. Double tubes are also used, with space for the steam between the inner and outer tubes. In stationary boilers, similar tubes and chambers are placed in the flues. "For marine engines " it will only be necessary to modify the details" "according to " the form of the boiler."

[Printed, 10*d*. Drawing.]

1862.

A.D. 1862, January 1.—N° 9. (* *)

BROOMAN, Richard Archibald.—(*A communication from Auguste Salzmann.*)—(*Provisional protection only.*)—" Improve-" ments in supporting and propelling vessels." " This invention " consists in supporting vessels on the water, and propelling them " by means of two or more sets of drums, one set or all of which " is or are armed with floats or paddles. The vessel may be " cylindrical, and may be made conical, or of any other convenient " shape, both at bow and at stern. It is supported clear of the " water, but may be furnished with a keel entering the water. " The paddle drums are driven by steam or other power con-" tained in the vessel. The vessel may be suspended from the " drum shafts by strong springs, similar to those used for loco-" motive engines. The vessels may be furnished with one or two " rudders."

[Printed, 4*d*. No Drawings.]

A.D. 1862, January 4.—N° 34.

HOWDEN, James.—" Improvements in steam cylinders and " boilers."

In double expansion engines, the high and low-pressure cylinders are placed alongside each other, and the steam is admitted to both cylinders by a single valve. The valve may have a working face on both cylinders. Part of the valve is moveable, after the plan patented in N° 2854, A.D. 1860.

In similar engines one or more high-pressure cylinders are worked " on the end of a low-pressure cylinder with one valve." All the ports are arranged on the low-pressure cylinder face. The valve covers all the ports and admits the steam to the high pressure and thence to the low-pressure engines.

To work the cut-off valves a plate is applied on the back of the slide valve. Projections are fixed on the plates which come in contact with other projections, " so placed as to move the plates " over the ports," and cut off the steam.

In the condensers patented in N° 2854, A.D. 1860, there may be two condensers, through both of which the air is passed to be *heated for the furnace*. Steam is passed through these alternately.

Steam is exhausted first into heating chambers, and the cylinder afterwards put into connection with the condenser.

A refrigerator is described in which the water is pumped to and fro through tubes in various divisions till it arrives at an open cistern. The cooling water is forced in a similar manner upon the outside of the tubes. The cistern has a self-acting valve.

The boilers patented in N° 2854, A.D. 1860, are also improved. The chambers therein mentioned are reetangular, and have doors for cleaning. These doors are fastened by the rods inside the tubes. The tubes have a plate upon each, which can be moved to clear them from soot. An arrangement of tubes and chambers is described.

Reference is made to this Specification in N° 3212, A.D. 1863.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1862, January 4.—N° 36.

BOUSFIELD, George Tomlinson.—(*A communication from Edward Sabine Renwick.*)—" New and useful improvements in " machinery for propelling water craft."

A shaft with two propeller blades works under water at each side of a vessel, and a recess in the hull allows the blades to rotate while the shaft is close to the side. The bearings of the shaft are in water-tight chambers, so that they may be accessible, and these may be in the hull of the vessel or projecting beyond it.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1862, January 10.—N° 80.

CLARK, William.—(*A communication from Louis Arnier.*)— " Improvements in apparatus for generating and applying steam " as a motive power."

1. Heating tubes in an inclined position in the arch of the furnace produce the steam.

2. Three cylinders work the same shaft with a three-throw crank, and one or two of these may receive the steam from the remainder so as to act by atmospheric pressure.

3. The exhaust steam on its way to the condenser heats the feed water, which is exposed to its action in small tubes.

4. The steam is superheated by passing through a cylinder in which are small tubes heated by the gases from the furnace as they pass to the chimney.

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1862, January 15.—Nº 116. (* *)

CUNNINGHAM, HENRY DUNCAN PRESTON.—" Improvements " in means or apparatus for protecting screw propellers from " entanglement, or being fouled by ropes or other bodies, also " improvements in means or apparatus for closing up the screw " aperture." For the purpose of affording protection to screw propellers from being fouled or entangled by hawsers, ropes, wreckage, and other bodies, the inventor attaches to the after stern post bars or rods working upon axes or joints fixed to the stern post or to the dead wood. The outer ends of these bars are bent downwards into a form to correspond, as nearly as may be, with that of the counter or tuck of the vessel. The bars are capable of being raised or lowered by chains or ropes leading into or on board the ship. When in position for protecting the screw, the outer end of the bar is immersed to some distance below the axis of the screw. From the ends and other parts of the bar, chains, ropes, or bars are carried to fixtures on the vessel. In the event of the ship running over a hawser or rope the chains will by this arrangement interpose and prevent the hawser or rope from coming in contact with the screw. By extending smaller chains, ropes, netting, canvass, or other textile or metal fabric from the chains to the counters, or as high as may be desired, a further protection is afforded against entanglement from floating bodies. When not required for protecting the screw the bars and protecting apparatus are raised. Jointed or flexible bars or ropes may be substituted for the chains described, and the bars may be placed inside cavities or open spaces in the stern post or dead wood, or they may be arranged to work inside the screw aperture or on the aft side of the stern post, so as to be more flush or on a level with the stern or dead wood when hauled up. Bars may also be fitted in front of the screw aperture, as well as abaft it, in order to form a framework for enclosing or protecting the screw; the bars before and abaft the screw aperture would be connected.

" By increasing the number of the bars on the principle of a " carriage hood or fan, and by applying circular shutter-like plates " or bars to the outer surface," " a more complete enclosure of " the screw " is obtained than that here described.

The improvements in closing up the screw aperture consist in the employment of shutters, hung one on each side the after stern post or other convenient part to close the aperture in the dead wood when the screw is raised out of the water. "The after stern "post must be the same width or wider than the screw aperture" to carry shutters wide enough.

[Printed, 1*s*. Drawings.]

A.D. 1862, January 28.—N° 218.

MENNONS, Marc Antoine François.—(*A communication from Jacques Belou.*)—"Improvements in engines actuated by "heated air, or by combinations of air and steam."

"The essential feature of these improvements in caloric and "certain other types of motive engines, is the conversion of the "separate pump and driving cylinders into a single body, in "which are exerted at the same time, the suction and forcing of "the cold air supplied to the furnace, and the working power "of the heated air proceeding therefrom. By this arrangement "the temperature of the inner surfaces of the cylinder is reduced, "the action of the piston facilitated, and a considerable economy "is realized in demensions and cost over the motors of this class "as hitherto constructed."

Double-action engines may be formed by coupling two of these single-acting cylinders. A reservoir of oil is arranged so that "a cooling medium" "is established between the air and the "discs of the piston." The engines "may be started and their "movement regulated by a supply of air contained in a reservoir "of suitable capacity, in which the pressure is kept uniform, or "nearly so, by means of a column of liquid proceeding from an "upper recipient."

[Printed, 8*d*. Drawing.]

A.D. 1862, January 29.—N° 234.

MERITON, Thomas.—"Improvements in marine and other "boilers for generating steam."

Tubes are placed in the up-take at the back of the fire-grate, so as to generate steam by an apparatus which is readily accessible for repairs. In some cases a deflector causes the current of heated gases to impinge upon the tubes.

[Printed, 8*d*. Drawings.]

A.D. 1862, February 6.—N° 316.

HENRY, Michael.—(*A communication from Louis Coignard.*) —"*Improvements* in obtaining and applying motive power,

" and raising and forcing fluids, and in apparatus employed " therein."

An apparatus called the "aqua motor" is described at great length. It consists of a wheel, made of a number of parallel discs joined by plates so that there are passages radiating from the centre to the circumference. Fluid is admitted at the centre and is driven outwards along these passages by centrifugal force. The wheel revolves within a fixed close chamber. This chamber has an opening for the exit of the fluid, and the whole arrangement, according to the calculations given by the inventor, " constitutes " a generator generating more power than is applied to work it." The wheel may be constructed of discs alone, without intermediate plates. A "working receiver" receives the steam from the " generator," and "acts in such manner as to apply the power " which the aqua motor generates." "Turbines or else machines " in which a continuously acting column, or impinging stream of " water, is employed," may be used for the working receiver, but the inventor prefers an apparatus termed by him a "rotative." This consists of a drum, the axis of which is fitted with vanes. Upon these the water impinges and revolves the drum. A vessel may be propelled by directing the stream from the apparatus through pipes leading to the external water. Various adaptations of the apparatus are given. When once set in motion it will work itself. To stop it the flow of water need only be cut off.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1862, February 10.—N° 341.

PHILP, Richard, and PHILP, John.—(*Provisional protection only.*)—"An improvement in propellers for propelling ships, " boats, and other vessels in water."

The surface of the blades is increased " at the outer extremities " of their leading edges," and " the corresponding portion of the " delivery edges " is cut away, " so that the horizontal distance " between the leading corners of the crowns when the delivery " edges are perpendicular, is greatly increased for the same " diameter of propeller and surface of blade over the corre- " sponding distance between the leading corners of propellers " hitherto in use, while at the same time the horizontal distance " between the delivery corners is reduced as near as may be to " a point. The blades so placed spread out laterally on each " *side* until they make but one angle, instead of two vertical

" angles, as in propellers hitherto made (as near as may be), viz., " at the delivery corners, as seen by a spectator looking through " the propeller from one crown to the other."

[Printed, 4d. No Drawings.]

A.D. 1862, February 11.—N° 354.

MACNAB, William.—" Improvements in steam engines."

The invention comprises arrangements applicable to engines with combined cylinders, and " a general arrangement of marine " engines " in which " such combined cylinders are disposed in " a novel manner."

The superheated steam " before entering the high-pressure " cylinder, or a part of it, is introduced from the main steam pipe " into a series of piping " inside the eduction steam chamber, whence it passes to the high-pressure cylinder. Highly heated steam may be passed through pipes inside the eduction steam chamber, and thence through the jackets, in order to raise the temperature of the steam from the high-pressure to the low pressure cylinders.

Marine engines may have four cylinders, two on each side of the shaft, which has two cranks at right angles to one another. There is one high-pressure and one low-pressure cylinder at each side of the shaft, and the high-pressure cylinder on one side acts on the same crank as the low-pressure on the opposite side. The low-pressure cylinders may have double trunks from which connecting rods pass to the crank, while each high-pressure piston-rod is connected to the opposite low-pressure piston by a cross-head and rods passing through the cylinder cover. Or else the usual arrangements may be employed.

" All the cylinders, covers, and eduction or intermediate steam " chambers, are provided with steam jackets; the eduction or " intermediate steam chambers are connected and in communica- " tion with one another, but may be kept separate if preferred. " Four bearings are provided on the engine framing for the crank " shaft, two of them being between the cranks. The eccentrics " for working the valves of the low-pressure cylinders are between " the two inner bearings, whilst those for working the valves of " the high-pressure cylinders are in each case between the crank " and the inner bearings.

" It is intended to use surface condensers with these engines, " two being placed against the forward end of the engines, whilst

" the air pumps, feed pumps, and circulating pumps arranged in " immediate connection with the condensers are conveniently " worked by a prolongation of the shaft. The arranging of two " pairs of combined cylinders so that the individuals of each pair " work cranks at right angles to each other, and more or less, as " herein-before described, may also be adopted in the case of " engines having vertical or inclined cylinders."

[Printed, 10*d*. Drawing.]

A.D. 1862, February 12.—N° 367.

BRICKHILL, JAMES.—" Improvements in the cylinders and " pistons of steam engines."

The improvements are applicable to marine engines and to all engines with inclined or horizontal cylinders. Their object is to reduce the friction of the piston on the "bore" of the cylinder. They " consist principally in forming a longitudinal groove in the " lower side of the interior of the cylinder, and in placing " therein a lodge key or 'feather,' on which a corresponding " groove or notch in the piston works. A small friction roller " (let into the piston) runs on this key or 'feather,' and supports " the whole weight of the piston, thus obviating the friction (and " consequent wear) of the piston on the lower part of the cylinder. " The under part of the key or 'feather' is inclined, and a corresponding wedge is placed below the same in the groove, such " wedge being attached to a rod passing out through a stuffing " box in the cylinder cover, so that by forcing the wedge forwards by means of a nut on the screwed end of the rod, the " whole surface of the key or feather may be raised perfectly " parallel to compensate for any wear that may take place."

"The piston is packed by means of two half rings of metal " expanded by means of a wedge, the lower ends of the half " rings embracing the sides of the key or 'feather' and keeping " the joint steam-tight; the upper surface of the key or 'feather' " is packed by means of a packing piece sliding in a groove in " the piston and pressed downwards by means of a spring.

[Printed, 8*d*. Drawing.]

A.D. 1862, February 12.—N° 372.

SPENCER, THOMAS.—" Improvements in propellers for navigable vessels, and in engines for actuating the same, parts of " *which* are applicable to other purposes."

"The propeller consists of a number of paddle floats, each "formed with three long narrow leaves or feathers radiating from "the longitudinal face of an axle or common centre, and fixed at an "angle of 120° to each other. These paddles are mounted loosely "on their longitudinal axis, parallel to each other, having their "bearings at each end supported on two endless chains, which "are stetched out in an horizontal direction and work over "pulleys. The outer pair of pulleys are mounted in moveable "bearings, so that the outer or stern end of the apparatus may "be lowered down or elevated at pleasure, according to the load "draught of the vessel. The propelling apparatus is placed in "a well or recess formed in the stern of the vessel to which it is "applied. The driving power used to actuate the propelling "apparatus consists of a rotary steam engine, having a fixed "cylinder consisting of a hollow ring in which revolves one or "more pistons mounted on radial arms springing from a centre "transverse shaft having its axis in the centre of the so formed "cylinder. The cylinder is fitted with one, two, or more inlet, "and one, two, or more outlet valves; a sliding diapragm is "introduced between each inlet and outlet valve, forming sur"face pieces dividing the cylinder, and the sides of which act "alternately as an abutting surface for the steam, and to divide "it from the exhaust. These sliding diaphragms are actuated "from the centre shafts by a cam or eccentric motion. The "engine is connected to the propelling apparatus by a cog wheel "keyed on to the centre shaft, from which the radial arms carry"ing the pistons spring, and gears into a second cog wheel on "the shaft containing the two inner pulleys, over which the "endless chains carrying the propeller floats work."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 13.—N° 377.

PETERS, John.—(*Provisional protection only.*)—"Improve"ments in portable steam engines, applicable to locomotive, "stationary, and marine engines."

An oscillating cylinder works a crank on a shaft, and these parts of the engine are within the steam dome of the boiler, the shaft projecting through stuffing boxes.

[Printed, 4*d*. *No Drawings.*]

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A.D. 1862, February 13.—N° 383.

ABEL, Charles Denton. — (*A communication from Jean François Cail.*)—" Improvements in towing boats or other vessels " on rivers, and in apparatus employed for that purpose."

A heavy chain is laid on the bottom of a canal or river, and a tow boat with wheels on deck turned by steam, winds up the chain at one end of the boat and lets it fall into the water behind. To facilitate the passage of the chain over the deck when the boat goes round a bend in the channel, platforms turning on a fixed centre near each end of the boat carry the chain on pulleys.

[Printed, 10*d.* Drawing.]

A.D. 1862, February 13.—N°. 384.

DAVISON, Thomas.—" Improved means for preventing the " corroding of steam boilers."

" A salt or salts (such as the carbonate) of soda, potash, or " lime," is introduced into the water to neutralize the corrosive " action of the injurious agent " in the water of marine and other boilers. The proportions vary, but in general "from about " ten ounces of a carbonate salt down to a quantity barely sufficient to render the water alkaline, should be added to each " gallon of water. Special impurities may require the use of " phosphates or nitrates of soda or potash."

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 13.—N° 391.

McCONNELL, James Edward.—(*Provisional protection only*). " Improvements in parts of boilers and furnaces for locomotive " and other engines."

Fire-bars for marine and other furnaces are made convex, thicker is the middle than at the ends. They may be cast separately, or in sets of two or more. They are placed transversely instead of longitudinally.

Tubes for steam generators are lined with zinc, spelter, or other hard metal.

[Printed, 4d. No Drawings.]

A.D. 1862, February 14.—N° 400.

JOHNSON, John Henry.—(*A communication from Charles Arnaud and Joseph Labriola.*)—" Improvements in machinery or " apparatus for propelling ships and boats."

At each side of a vessel is a rod caused to move fore and aft, carrying floats under water which propel the vessel and feather and collapse for the return stroke. The rods may be jointed so as to be detachable, and allow the propelling parts, which are represented as under the vessel's counter, to be raised out of the water.

[Printed, 10*d.* Drawing.]

A.D. 1862, February 15.—N° 410.

COOKE, John.—" Improvements in the method of propelling " ships and other vessels."

Screw propellers are placed on each side of a vessel, and so inclined to the line of the keel that their action forces the water inwards to the "run" of the vessel, and thus propel her, or they may be set in advance of the midship section, so as to obviate the resistance of the wave caused by the vessel's motion.

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 28.—N° 545.

MUNTZ, William Henry. — " Improvements in paddle " wheels."

The floats of a paddle wheel, instead of being set across horizontally, are affixed radially along each arm of one or more sets of arms on the paddle shaft, so as to dip deeper and to cause less accumulated concussion on entering the water. The floats are represented of the shape of an oar blade rounded at the ends.

[Printed, 8*d.* Drawing.]

A.D. 1862, February 28.—N° 552.

PARKER, James.—" An improved mode of applying steam as " a motive power for propelling vessels and for other purposes."

A jet of steam discharged into a pipe so as to draw air with it, is used to propel and steer vessels and to work floats, helices, turbines, and other rotating machinery. This part of the invention consists of improvements on the apparatus described in the Specification of No. 2374, A.D. 1860.

The jet should issue through an aperture of the form of a fine slit, and the air may be heated by the waste heat of the furnace, or may be cooled by exposure to water, or the jet may draw with it the product of combustion instead of allowing them to pass through a funnel.

The steam may be superheated. The nozzles may be trumpet-shaped and the air pipes adjustable in distance from the steam jets. The combined air and steam when it is to propel vessels may rise by its buoyancy along channels in the direction of its return.

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 8.—N° 629.

GRICE, Samuel.—(*Provisional protection only.*)—"An improve-"ment or improvements in propellers for propelling ships and "boats and other vessels."

"On the end of a shaft similar to that ordinarily employed for "screw propellers, to which shaft a rotary motion is given [by "steam or other power," is fixed "a circular desk or plate, to "which a hemisphere or dome is secured by screws or otherwise, "the base of the hemisphere being in contact with the said "plate. On the exterior or convex surface of the said hemi-"sphere a series of vanes or blades are fixed. The said vanes "or blades are so situated on the dome that their narrow ends "meet at the summit of the said dome. The said blades extend "from the summit of the dome to the base thereof, the course "of each blade being oblique, that is, inclined to the axis of the "dome. The said blades are made deeper as they approach the "base of the dome, and the planes of the blades are inclined to "the surface of the dome; the base of each blade may be secured "to a flange at the base of the dome. For boats and small "vessels three equidistant blades are enough, but for large "vessels more than three of the said blades may be used."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 11.—N° 654.

BARTER, William.—(*Provisional protection only.*)—"Improve-"ments in apparatus for propelling vessels, and for enabling "them to work off lee shores during storms."

"A spar or boom is suspended from the stern or other con-
" venient part of the vessel; this spar or boom exceeds in length
" the distance from the point of suspension to the water, and
" near its lower end other pieces are firmly secured to it so as to
" form a flat frame of some width, and to each side of this
" frame a flap or paddle is hinged or jointed at right angles to
" the length of the spar or boom, or a greater number of flaps
" or paddles may be employed. When the vessel to which the
" apparatus is attached is in motion, the spar or boom will
" assume a position inclined to the surface of the water, the
" frame and paddles jointed thereto being towed through the
" water. This being the arrangement and the vessel being tossed
" by the waves, as the stern or other part of the vessel descends
" the paddle will open out from the frame, and will check the
" descent of the apparatus through the water, chains or other
" suitable instruments being employed to stop the paddles when
" they come into such a position as to offer the greatest amount
" of resistance to the water. The descent of the frame being
" thus resisted an impulse will be given by the spar or boom on
" which it is constructed to the stern or other part of the vessel
" which will thus be propelled as the stern or other part of the
" vessel rises. The paddles shut up close against the frame and
" offer but slight resistance to the water. This apparatus, as it
" acts the more efficiently the greater the amount of motion
" given to the vessel by the waves will be very useful in enabling
" vessels to work off lee shores during storms."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 20.—N° 774.

CAMPBELL, JOHN GEORGE TRUSCOTT.—(*Provisional protection only.*)—" Certain improvements in ships' propellers.

The propeller is to be named "Campbell's propeller." "It is
" be worked rotary in a hole or otherwise at the stern of a ship,
" and consists of a boss with two or more blades. The roots of
" the blades are fixed in a line with the length of the boss, and if
" equal distances be taken along the edges of the blades from
" the boss, and a straight edge be placed from distance to distance,
" it would show straight lines across the faces of the blades,"
" and likewise from the boss to the periphery are straight lines,"
" but only the *centre line* is perpendicular to the centre of the

" boss;" "the others are inclined to the boss, and reversely on " either side of the centre line," "and likewise the edges of the " after driving faces of the blade are bevelled off," "so that the " faces of the blades of the propeller are equal, and have the same " power to drive astern as in driving ahead." Without the drawings the above description is hardly intelligible, but no further explanation is given.

[Printed, 6*d.* Drawing.]

A.D. 1862, March 28.—N° 863.

ASHE, William Austin. — (*A communication from Edward David Ashe.*)—" An improved mode of and apparatus for driving " the propelling shafts of ships or vessels."

The to-and-fro action of a piston in a cylinder is caused to act upon a spiral slot on the propeller shaft, which will thus be turned by the piston. Arrangements are described for working the valves by an endless screw and pinion movement.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1862, March 28.—N° 865.

OWEN, Robert Alexander.—" Improvements in feathering " and varying the pitch of screw propellers for steam ships."

The blades of a screw propeller are attached to the boss by nuts and washers. The shaft is moveable fore and aft, and by screws or wedges, and locks and bolts, the pitch of the blades may be altered or they may be feathered, without stopping the shaft. The mode of action of the several parts which are thus arranged is described in connection with the drawings.

[Printed, 10*d.* Drawing.]

A.D. 1862, April 9.—N° 1016.

KNOWELDEN, John.—" Improvements in steam, water, and " other fluid engines."

In marine engines the frame is hollow and round. One or more cylinders are fixed to the frame, but an uneven number is preferred. A division separates it into two chambers, " into one " of which the water to supply the boiler is admitted, which " meeting the first discharge of steam from the exhaust pipes " causes partial condensation thereof, while at the same time the " *water becomes* heated; that portion of the steam remaining

" uncondensed passes into the second chamber, when again " meeting with a further supply of cold water, the condensation " is completed."

In open cylinders " the piston is bored to form the joint of the " connecting rod, and is fitted with a cap or gland, and bored " spherical, so as to allow the piston free action." The cylinder covers and bottoms are made with a chamber between which and the cylinder is fixed a diaphragm. There is " a connection " between the chamber and the supply pipe, to equalise the " pressure in the cylinder," so as to leave " the diaphragm at " liberty to move by priming or other causes." When surface condensers are used, they are formed of " a series of flat chambers, " through the centre of which passes a pipe with small holes " made in each chamber." The water from the air pump goes " through a rotary refrigerator, which at the same time gives " motion to the water acting on the condenser."

[Printed, 10*d.* Drawing.]

A.D. 1862, April 17.—N° 1116.

KRUPP, Alfred.—(*Provisional protection only.*)—" Certain improvements in the manufacture of screw propellers."

The " invention consists in forming screw propellers in one " piece or in two or more pieces from a solid block or blocks of " cast steel, and forging the said block or blocks into the " necessary shapes. Where it is desirable for convenience or " economy to form the propeller in two or more pieces," the pieces are forged from solid blocks of cast steel and fitted together.

[Printed, 4*d.* No Drawings.]

A.D. 1862, April 17.—N° 1119.

GRIFFITHS, John.—(*Provisional protection only.*)—" Improvements in propelling ships and other navigable vessels."

The " invention relates to that system of propelling by water " where motive power, steam, or other engines are employed to " work pumps or propelling cylinders, which take in and force " out water through the hulls of the said ships or other navigable " vessels, such water being ejected under the waterline at an " angle, or in direction towards the bow or stern, will cause a vessel

" to move in the opposite direction to the ejected current, ahead, " astern, or otherwise, as desired. The pumps may be single " or double-acting, and are placed by preference athwart ship, " alongside direct-acting engines in or about that part of the " vessel deepest in the water. To each of the said pumps, if " single-acting, are two communications by tubes with the water " outside the vessel, the terminations of which are made to direct " the water taken in by the action of the pumps or propelling " cylinders, and displacement of the vessel downwards, and at " an angle to the keel. In the tubes above named, or in or " about the tubes or pumps, parts or the whole of which may " be covered with water confined in a tight compartment, are " throttle or other valves so placed and under the control of the " engineer that by moving the necessary levers he can alter or " reverse the course of a ship without stopping or reversing the " engines."

[Printed, *4d.* No Drawings.]

A.D. 1862, April 19.—N° 1138.

PHILLIPS, Joseph Scott.—" A new method and apparatus " for the propulsion of vessels through the water."

A wheel used at a vessel's side or at its stern is fitted with floats like a paddle wheel, each float being a propeller which is termed a " hoof screw paddle " and its shape " is that of the " hoof of a calf of any age to which in point of working fact the " foot of the cormorant tribe answers."

Directions are given with the drawings for describing the curved form of the several parts.

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1862, April 21.—N° 1158.

CLARKE, Edwin Francis.—(*Provisional protection only.*)— " Improvements in propellers for steam ships and other vessels."

One part of the invention relates to screw propellers. The boss is larger than usual, and hemispherical, with the plane surface towards the fan and stern post, which is shaped to correspond with it and prevent backwater.

The other part of the invention is for the use of floats on horizontal rods carried on two sets of cranks, one set being on the shaft of the engine, so that the rods enter and work through the water and rise again while their planes are vertical.

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 22.—N° 1172.

JOHNSON, JOHN HENRY. — (*A communication from Jean Pierre Victor Le Rouge and Jacques Henri Charles de Berly.*)—(*Provisional protection only.*)—" Improvements in apparatus for " propelling and manœuvring ships."

The screw propeller shaft outside the vessel is jointed and worked by bevilled wheels so that it may be turned at will in any direction to steer by. A vane may be added to turn the shaft to such a direction as will work the vessel off a lee shore, or the propeller may be partly worked by a wind wheel.

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 28.—N° 1243.

VAILE, ROBERT.—" Improvements in propellers for ships and " boats."

The invention relates to endless chain propellers, and consists in means for maintaining the float attached " to the chains in " proper positions, and for driving the chains. The chains are " passed round two or more drums or rollers. The drums are " furnished with projecting rims or collars having indentations to " receive the chains; the drums may be placed either in a horizontal, vertical, or angular position. The floats are cut so as " to receive the drum collars, and attached to the chains a little " above or below the centre. The paddles work in grooved guides, " and are furnished with projecting arms and friction rollers; " they are feathered, and are kept from getting into a wrong " position by the action of the water, and by their arms coming " into contact with guides. The upper part of the propeller " works in a case, and provision is made for hoisting the whole " apparatus on deck in case of need."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1862, April 30.—N° 1272.

LEIGH, EVAN.—(*Provisional protection only.*)—" Improvements " in the construction of ships and floating batteries, in mounting

" their guns, and in the application of steam power, parts of " which improvements are also applicable to land batteries and " forts."

The inventor says:—

" I make the paddle-wheel propellers work between pontoons " astern, the said propellers being made with shrouds and buckets " similar to a water wheel; the buckets being air-tight or partially so, the edge of each float being set a little zig-zig. When " they enter the water the air within them is compressed, and " serves to keep the water towards the periphery of the floats. " As the floats leave the water, the air rushes out and pushes the " water away from them, the recoil acting in the direction of " propulsion. In other respects the paddles are detached and " acted upon for steering purposes if required."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 30.—N° 1273.

PIATTI, Thomas.—(*Provisional protection only*.)—" Improvements in the propulsion of ships and other vessels, and in the " means and apparatus employed for this purpose."

The floats of a paddle wheel are caused to feather on their horizontal axes by the action of studs which move in excentric groove guides fixed to the vessel's sides.

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 10.—N° 1405.

MOORE, Robert. — " Improvements in the structure and " appliances of ships and other vessels."

The only part of the invention relating to the present series consists in the use of " double or shifting shafts for driving " propellers, and with the appropriate gearing and appliances " therefor." The propeller is connected " to each shaft, so as " to be applicable for working partially below the line of keel " or bottom of the vessel." This is said to be " sufficiently " clear without special description." The drawing apparently shows two shafts, with a screw mounted on each, but no further description is given.

[Printed, 8*d*. Drawing.]

A.D. 1862, May 12.—N° 1424.

CARTWRIGHT, Henry.—"Improvements in propelling and "steering screw steam vessels."

The external part of the propeller shaft is worked by a universal joint, and has its after bearing in the outside edge of a skeleton rudder. As this rudder is turned the shaft works, so as both to propel and steer the vessel.

[Printed, 8*d*. Drawing.]

A.D. 1862, May 13.—N° 1434.

GAVILLET, Jean Daniel, and GANDON, Jean Pierre Felix.—(*Provisional protection only.*)—"Improvements in paddle "wheels, applied either for propelling steamboats, or as prime "movers."

"The invention consists in a peculiar arrangement and com"bination of the paddles or pallets of water wheels used either "for propelling steam boats, or as prime movers, which paddles "are hinged on horizontal shafts properly disposed around the "circular plate or frame of said wheels in such a way that these "paddles move freely on their shafts as the wheel revolves, the "hinging point being at about the third part of the length of "the paddles; the longest or heaviest side falls freely downwards "when out of the water, and when the fluid presses on them "the longest arm of the said paddles bears against stopping rods "or bolts fastened in the wheels on each side of the paddles, "so as to stop its hinge motion on either side in the most "advantageous position either to work or slide through the "water as the wheel revolves, allowing them to take a radial "position, which is maintained as long as they work, and is "modified before getting out of the water, so as to avoid their "raising any of the fluid, as is the case with common paddle "wheels."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 15.—N° 1466.

JOUVIN, Jean Pierre.—"An improved process for preserving "iron-plated and other vessels and metallic articles from oxida"tion, and preventing ships' bottoms from fouling."

Amongst other articles marine boilers may be protected by being coated with a double layer of paint "made of powdered " metallic zinc," or by having a layer of zinc sheets applied to them.

[Printed, 4d. No Drawings.]

A.D. 1862, May 20.—Nº 1524. (* *)

CLARK, WILLIAM.—(*A communication from Auguste Chesneau.*) —" Improvements in paddle and other hydraulic wheels."

The object of these improvements is causing the surfaces of the floats to be at right angles to the action of the water. "I use " either flat or undulating pallets, each furnished with axes turning " in bearings in the sides of the wheels; they are further pro- " vided on one edge with a counterbalance weight." "In order " to impart greater power of resistance to the pallets when the " wheels revolve with great rapidity, I place a small crank on the " end of each of the axes of the pallets, the crank pin of which " has a bearing in a large metal ring which turns freely, by " preference round a central boss independent of the wheel " shaft."

[Printed, 4d. No Drawings.]

A.D. 1862, May 20.—Nº 1527.

KENNEDY, JOHN.—" Improvements in ships' propellers."

The " invention consists in forming propellers by fitting to an " axis two blades in the form of a tail of a fish, and in making " the blades more or less deep and long, and in altering their " pitch according to the speed at which the ship to which the " propeller is to be fitted is to be driven."

Several drawings show modifications of the forms indicated above.

[Printed, 1s. Drawings.]

A.D. 1862, May 21.—No. 1534.

BUSH, WILLIAM.—" Improvements in the construction of ships, " and in shields or armour for ships and batteries."

One part of the invention relates to a floating "fort," fitted with two or more cylinders, in which valves or screws may be made to work to propel it. A "gun and rocket-boat" is also described, which may be made available for carrying merchandise. It has a propeller at each end, each driven by a separate engine.

[Printed, 1s. 10d. Drawings.]

A.D. 1862, May 27.—N° 1590.

HAY, John.—(*Provisional protection only.*)—"Improvements in "war ships, also applicable in part to floating and land batteries "or forts, and in part to mercantile and other vessels."

The part relating to propellers is as follows:—

"Screw propellers, made by preference of malleable iron, are "provided at each end, and there are also propellers amidships, "three sets of engines being provided for driving the series, and "being connected by shafting in such a way that they may work "in concert or separately. Each screw propeller is in a well or "opening near the stern, and consists of blades mounted so as "to balance each other on opposite ends of a short crank shaft "worked by a connecting rod from above, and mounted in a "swivelling frame, so that any direction may be given to the "propelling action. Rudders are also provided in spaces beyond "each propeller, but within, and protected by, each stem, there "being also a strong guard which protects both rudders and "propellers from injury."

[Printed, 4d. No Drawings.]

A.D. 1862, May 29.—N° 1618.

GRIFFITHS, Robert.—"Improvements in marine propellers "for ships and boats, and for the sheathing of iron ships with "metal sheathing to keep them from fouling."

The part relating to the propulsion of ships is thus described:—

"The improvements consist, first, in constructing screw propellers for steam ships and boats with blades and centre boss "of similar form and construction (or the blades may be cast on "the boss) to those described in the Specification of a Patent "granted to me the 20 February 1858, No. 319, but having four "blades (or two sets of blades) which are to be fixed either to "the same boss or to separate bosses on to the screw shaft, and "so fixed that one set (or pair of blades) is placed before the "other set, the first set or pair of blades next the shaft to be of "larger diameter than the after set, so as to get a greater hold "on the water for propelling the ship."

The second part of the invention relates to side wheel propellers constructed of discs of suitable diameter, having the
" centre parts constructed with arms and centres similar to those
" generally used for paddle wheels, but having the outside rims
" of such discs corrugated or in a zig-zag form instead of being
" flat, in order to offer sufficient resistance when driven through
" the water to propel the vessel. Either one or a series of these
" discs or wheels can be used on each side of the vessel as may
" be required to propel the ship, or the outside rims may be made
" flat, and the inside rims only be made corrugated or in zig-zag
" form."

[Printed, 8*d.* Drawing.]

A.D. 1862, June 10.—N° 1728.

DAVIS, NATHAN. — (*Provisional protection only.*) — "An im-
" proved propeller for ships or vessels."

The propeller is stated to be composed of oars or paddles united by a frame and adjusted by cranks to two shafts with a box to cover the whole. When it is submerged the paddles or floats turn on hinges.

The particular arrangements for the working are not described.

[Printed, 4*d.* No Drawings.]

A.D. 1862, June 16.—N° 1782.

CURTIS, WILLIAM JOSEPH. — "An improvement in the
" construction of screw propellers."

The propeller shaft is connected with the propeller by a universal joint within the propeller itself and in a vertical line with the axis of the rudder. The after end of the propeller is connected with the rudder, and the propeller works in a blank space cut out of the fore end of the rudder and the after part of the stern post and dead wood. Then as the rudder is turned the propeller is directed to aid in steering while it revolves.

[Printed, 10*d.* Drawing.]

A.D. 1862, July 11.—N° 1995. (* *)

HILL, JOHN REED.—(*Provisional protection only.*)—This invention relates to a mode of fixing and working an engine governor *in steam vessels.*

The inventor says :—

"To the under side of the deck in the engine room I fix a "suitable frame, from which I suspend a common two-ball "governor on pivots, so that it hangs freely, always remaining "in a vertical position, uninfluenced by the varying position of "the vessel. On the top of the governor spindle there is a "universal joint fixed, connecting it with another spindle, the "upper end of which works in a bearing fixed to the ship. This "latter spindle will be in a permanent position as regards the "ship, and receives motion for driving the governor at the upper "end. Both these spindles are hollow, the lower one containing "a rod, with flexible joints at the top, for transmitting motion "from the balls to the lever of the throttle valve."

[Printed, 4d. No Drawings.]

A.D. 1862, July 22.—Nº 2083.

GROGAN, RODERICK.—"Improvements in screw propellers of "steam vessels, and in the arrangement thereof."

A frame carrying blades in a nearly vertical position is so turned by a shaft and directed by a cam or excentric action, as to rise and fall while it also acts fore and aft through the water.

In another propeller the blades are set with their flat or curved surfaces at right angles to each other, and while they rotate about the axis of the shaft, they also rotate about their own common axis, so that while submerged the blades feather during the revolution.

There are various forms of propellers described in the Specification.

[Printed, 1s. Drawings.]

A.D. 1862, July 25.—Nº 2116.

CLARK, WILLIAM.—(*A communication from Louis François Rojare and Louis Charles Edouard Rojare.*)—(*Provisional protection only.*)—"Improvements in rafts or structures applicable for "the ordinary purposes of marine and inland navigation, as also "for saving life in cases of shipwreck or otherwise."

A raft is described, composed of hollow cylinders. These are to be "furnished with paddles," "so as to form large paddle "wheels." They are to be revolved by a steam engine, in a manner not described. In another part of the Specification it is said that "*the cylinders* are furnished with shafts, and are pro-

" pelled by means of gearing set in motion by a crank in " connection with another set of wheels."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 2.—N° 2188.

ONION, THOMAS.—" Improvements in rotary steam engines " and in propellers adapted to propelling vessels in water."

Improvements on No. 11,539, A.D. 1847.

A rotary engine with four sliding vanes has two inlet and outlet passages for the steam on opposite sides of the case. The vanes are run in to pass the abutments by rollers, and to lessen the friction, they run on flanges at the ends of the rotating piston.

A flange is added at the outer rim or edge of a screw propeller arm to cause the water to be driven aft, in the direction of the vessel's motion.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1862, August 13.—N° 2276.

GALLI, LEONARDO.—(*Provisional protection only*.)—" Improve- " ments in apparatus for propelling vessels."

"The propeller consists of two paddles which are placed below " the water line, and by preference near the stern of the ship, " and which are moved to and fro in the direction of the length " of the vessel; they are jointed to a metal frame which is moved " to and fro in guides in a slot or rectangular opening in what " is called the deadwood; this movement is given to the frame, " and so to the paddles by a hollow rod or shaft reciprocating in " the direction of the length of the keel. The stroke of the " shaft, when in motion, is proportioned to the size of the ship, " and is effected by means of a crank and connecting rod, which " are adapted to the engine. The paddles are open, so as to " project from the sides of the keel when they are going in the " direction opposite to the intended movement of the vessel, and " shut so as to lie within the opening in the keel in the return " movement. The shutting and opening of the paddles is " effected a few moments before the change of the direction of " their movements by two rods which pass through the hollow " shaft, each paddle being connected to one of the rods. When " it is desired to reverse the direction in which the vessel is " propelled, the paddles are by the rods which pass through

" the hollow shaft caused to be open when the shaft is moving
" in the direction in which it was moving when they were before
" shut, and to be shut when they were before open."

[Printed, *4d.* No Drawings.]

A.D. 1862, August 15.—N° 2301.

CARVIN, THOMAS.—" Improvements in screw propellers."

The shape of the propeller blade is that of an elongated irregular oval.

The blade is secured to the boss by insertion of the arm into a polygonal-shaped socket, so that the pitch may be altered by removing and resetting the blade.

[Printed, *6d.* Drawing.]

A.D. 1862, August 22.—N° 2352.

CARWOOD, WILLIAM, BOAZ, WILLIAM, and COLWELL, CHARLES.—" Improvements in apparatus for propelling ships
" and other vessels."

The propeller blade is of a partly spherical shape, with its convexity in the direction of the vessel's motion.

Propeller blades are fixed on axes turning in a moveable boss on the propeller shaft, and so geared together, that by an arrangement of clutches and wheels, the position and therefore the action of the blades may be modified or reversed.

[Printed, *10d.* Drawing.]

A.D. 1862, September 2.—N° 2428.

GLANVILLE, RICHARD.—" Improvements in marine and
" other engines."

The inventor says:—

" The improvements relate to the construction of steam engines
" for the purpose of economising fuel and space, to accomplish
" which I place a series of steam cylinders within each other;
" these cylinders have pistons fitted to each, and connected by
" rods and cross heads or any other suitable mode to cause them
" to move simultaneously. Each cylinder is supplied with steam
" by the aid of valves in order that each piston shall receive the
" steam from each other alternately, the steam being first used
" in the central cylinder expands as the cylinders enlarge till it
" is condensed upon the principle commonly known as Woolf's."

[Printed, 1s. Drawings.]

A.D. 1862, September 8.—N° 2468.

WILLIAMS, Charles Wye. — “Improvements in steam “ boilers.”

The “invention is designed to increase the evaporation or “ vaporizing effect of steam boilers, and consists in substituting “ for the ordinary long tubes or flues employed in locomotive, “ marine, and other steam boilers, sets or series of short tubes or “ flues of a circular, rectangular, or other form, at short distances “ apart, the ends of each set or series being fitted into tube “ plates or face plates like those into which the long tubes “ aforesaid are united. The object of this arrangement is to “ increase the number of tube plates or face plates against which “ the flame and hot gases generated in the furnace strike.”

The tubes are about two to four inches in diameter, and from eight to twelve inches long. “ A series of rectangular short flues ” may be substituted for the tubes. In short boilers the tubes or flues are conical. Sometimes the series of tubes are placed so that those in each row alternate with those in the next row.

[Printed, 1*s*. Drawing.]

A.D. 1862, September 30.—N° 2652.

LE BRÉTON, Elie Jean Marie. — (*Provisional protection only.*)—“ An improved propeller for boats and ships.”

Floats fixed vertically to bars work to and fro in the water, and are hinged so as to feather for the return stroke while they propel the vessel; and the bars may be so turned as to steer her.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 8.—N° 2714.

TERRY, Charles Frederick.—“ Improvements in machinery “ for propelling ships.”

Water is drawn into a vessel and forced along tubes by the revolutions of a screw. As the ports of the tubes opening fore and aft and towards each side are opened or closed, the action propels the vessel and steers her.

[Printed, 10*d*. Drawing.]

A.D. 1862, October 8.—N° 2719.

HAWKES, John Reeves. — (*Provisional protection only.*)— “ Improvements in propelling vessels.”

The inventor says :—

" I form the propellers with radial or other suitable formed floats " or boards and enclosed sides, so that the space between adjoining " floats or boards may form chambers open only at the " periphery for action upon the water; and I enclose these propellers, except when they act directly upon the water, within " boxes or compartments formed for them in the hull of the " vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 10.—N° 2735.

LOWE, JAMES, and HARRIS, JOSIAH.—" An improved construction of propeller."

The blades of propellers are formed, so " that when viewed in " edge view and in cross section, they will present a curved line " curling in opposite directions from the centre to the edges."

The manner of obtaining " the right curvature for blades of " different sizes and proportions " is thus described :—

"The manner in which we obtain the right curvature for " blades of different sizes and proportions is the following:— " Taking the extreme breadth of blade required, we divide that " measurement into four, and use the measurement thus obtained " forming four cubes of wood of a length equal or somewhat " superior to the length of the blade required. These long " cubes we string on to a rod," " and we then set them side " by side, so that the free end of the leading cube will be in " advance of the adjoining cube to the extent of one half its " width, and so on throughout the series." " Having secured " the cubes in this position, we cut away the projecting angles, " trimming down the cubes until an even surface is obtained." " We then hollow out the opposite faces of the blade," " and " thus produce the curved transverse line curling in opposite " directions."

[Printed, 10*d*. Drawing.]

A.D. 1862, October 10.—N° 2739.

WEALLENS, ELIZABETH, administratrix of WILLIAM WEALLENS.—(*Letters Patent void for want of Final Specification.*)— " Improvements in surface condensers for marine and other " engines."

Each end of a surface condenser tube may be encircled by a washer of india-rubber, and a nut on each or on one with a flange in the other admits of the tube being tightened up so as to force the washers into recessed grooves.

The water in surface condensers may be regulated in quantity by a moveable partition perforated so as to move along the tubes as required.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 10.—N° 2740.

ANDERSON, THOMAS.—(*Provisional protection only.*)—" Improvements in the construction of ships or vessels."

Two hulls with vertical interior sides are arranged parallel, and between them is fitted a central paddle wheel. Two other paddle wheels are fixed outside as usual. Instead of the outside paddle wheels a screw at the end of each hull may be used. In ships of war the outside paddle wheels are dispensed with.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 13.—N° 2759.

MAHON, ARTHUR IRWIN. — (*Provisional protection only.*) — " Improvements in propellers and paddle floats, also applicable " to the raising and forcing of water or other fluids."

" This invention relates to various forms of screws and screw " blades, and their combination and arrangement, so that the " vacuum caused by the ordinary working and their different " currents may be taken advantage of, and so that the centres of " all screws may be made to work effectively, and get rid of " centrifugal force and lateral loss.

" According to one arrangement any number of small planes " are used of a circular, elliptical, or other form, placed along " radial arms at angles on the screw principal, but bent at the " edges, so as to direct the water and retain a sufficient hold of " it, but not to retain it, as in Griffiths' screw.

" A second arrangement consists of a cylindrical screw con- " structed as follows, on the band forming the hollow cylinder :— " The pitch lines of the screw are traced, and a portion of the " band along the screw line is cut, so that it can be turned in ; " thus when the band is brought around into the cylindrical form " there are a series of spiral or screw openings on the cylinder

" and of screw threads or spirals turned in inside the cylinder; " the openings thus made run along the top or back of the blade, " and the cylinder represents a series of parallel screw or spiral " openings on its circumference. Any number of these cylinders " may be encased one within another on the same axis. This " form may be used as a pump, turbine, or water wheel.

" In a third arrangement the whole or part of the face of the " common or other form of screw is perforated with holes or open " spaces, the same being applicable to paddle floats.

" A fourth arrangement consists in a series of blades along the " front or front and back of the common or other screw blade, " so that the different angles formed and producing different " currents tend to the same object, and the centre of the screw is " thus made to work effectively.

" It is also proposed to form a screw propeller from the section " of a cone and a spiral or a curve produced, whether hyperbolic " or otherwise, and its sectional plane, such a screw combining " the three properties of increasing and diminishing pitch, " different radial length throughout, and that the conic section " and curve or plane and cone forming the blade will each act " together in forming the screw.

" The vacuum caused by the ordinary working blade will be " overcome in all the above cases by the manner of formation " above described."

[Printed, 4d. No Drawings.]

A.D. 1862, October 15.—N° 2789. (* *)

COWPER, Edward Alfred.—This invention relates to compound high and low-pressure engines, and to a mode of steam jacketting the reservoir or chamber which receives the steam after it has operated the piston in the high-pressure cylinder, before it is admitted to the low-pressure cylinder, the object being to maintain the boiler temperature of the steam until it passes to the condenser or to the atmosphere. These steam reservoirs are lined with metal so disposed as to leave a surrounding space between. On entering, the steam goes at once to the central space within the lining, but when leaving the reservoir it is conducted between the lining and the shell, before it engages the piston in the low-pressure cylinder. The form of the reservoir is not material, and its capacity may be varied; it may be composed of cylinders, tubes, or plates, with openings for the steam to go direct to the interior, which only when leaving should be brought in contact with the surrounding parts. The apparatus is applicable to engines working steam superheated on its passage from the reservoir to the second cylinder, and to all compound cylinder engines working high and low-pressure steam. It is stated that the relative capacities of the cylinders of such engines should be as 1 representing the high-pressure, to 3 representing the low-pressure. The invention is exemplified by drawings and descriptions of various kinds of compound engines, including inverted cylinder direct-acting marine engines, horizontal marine engines, horizontal stationary engines, high and low-pressure beam engines, more or less relating to the disposition of the steam jacketted reservoir, and the manner of its construction to suit its varied applications. There are also suggestions for utilizing the hot fire draughts of boiler flues for superheating purposes, and with regard to the advisability of using vertical tubes in surface condensers, and removing air bubbles from such tubes by means of spiral brushes; also in respect to the comparative advantage of working steam expansively in the cylinders, and putting chalk or other neutral base into boilers to unite with the oil and grease introduced with the distilled water, which has been acidified by repeated boiling.

[Printed, 2*s.* 4*d.* Drawings.]

A.D. 1862, October 31.—N° 2940.

SPINK, Daniel.—" Improvements in the method of propelling " ships and other vessels."

Steam from the steam chest passes into a tube, into which also the hot air from the smoke box of the furnace is admitted. The steam forces this hot air along the tube and out of it under water, so as to propel the vessel, while a partial vacuum is also caused in the smoke box, which increases the draught of the furnace.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1862, October 31.—N° 2950.

SICKELS, Frederick Ebsworth.—" Improvements in the " means of steering and manœuvring ships or boats, and in the " apparatus connected therewith."

Nearly the whole of the Specification is occupied with a *description of* a mechanical steering apparatus, the only parts which concern this series being that which describes a modification in the propelling engine, when it is also used to work the steering gear; and that which describes a means of increasing the draught of the furnace to give increased speed to the ship and overcome the resistance of the rudder.

In the former case, "to ensure the use of the least possible " power required to operate the steering apparatus, the valve or " valves which admit the steam or other fluid under pressure to " the working cylinders, is so connected with the steering " apparatus that while the steersman, by turning the steering " wheel, opens the valve to admit steam to the cylinders, so as " to cause the rudder to move, the steering apparatus in moving " will give this same valve or valves a closing motion, and thus " modify the extent of the opening of the valve and the rapidity " of admission of the steam or other fluid to the working " cylinders."

When a second engine is used to work the steering apparatus, it may be made to work a blower which drives a forced draught through the furnace of the propelling engine. This forced draught is used when the rudder is on. The same object may be attained by a jet in the smoke pipe.

[Printed, 3*s*. 6*d*. Drawings.]

A.D. 1862, November 6.—N° 3007.

HUTCHINSON, WILLIAM NELSON.—" Improvements in appa- " ratus or means for protecting the screw of steamers from " becoming entangled with or fouled by ropes or other bodies."

A flexible canvas screen with a network of wire links, is suspended in such a position round the screw propeller, as to protect it from floating substances which might foul it, and arrangements of ropes and bars are described for shipping and unshipping the apparatus.

[Printed, 10*d*. Drawing.]

A.D. 1862, November 12.—N° 3051.

DUNTZE, JOHN ALEXANDER.—(*A communication from Edward David Ashe.*)—" Improved apparatus for communicating rotary " motion to shafts or axles for various purposes."

Improvements upon Ashe's Patent, No. 863, A.D. 1862. The steam cylinders are placed alongside the propeller shaft, and the pistons communicate a reciprocating motion to drivers or stud pins which reciprocate in a double helical groove on the shaft, and so rotate it. Various arrangements, according to the number of cylinders and their position, are shown in the drawings, but the principle in all is the same.

[Printed, 1s. 4d. Drawings.]

A.D. 1862, November 13.—N° 3065. (* *)

KOPISCH, Carl Gottlieb.—" Improved apparatus for pro-" pelling, steering, and ventilating vessels." This invention relates to a novel arrangement of apparatus whereby the propulsion of steam ships or vessels may be effected through the injection into the water on which such vessels float, of columns or streams of heated air.

"The apparatus may be described as a furnace contained " within and extending from end to end of an elongated hori-" zontal steam boiler, below which is situated an air reservoir. " This reservoir is supplied with air by a pumping or blowing " engine of any ordinary or suitable construction, which air I " propose to draw from the hold of the ship, bringing the various " cabins into communication, by air pipes for the purpose of " effecting their ventilation. This pumping engine is to be " worked by a steam engine supplied with steam from the steam " boiler. The air reservoir is brought into connection with the " ash-pit of the furnace, by pipes which supply air under pressure " to the fire-place. The furnace is connected at its rear end with " a chimney by two openings of different diameters, both of " which are capable of being easily closed. From the furnace " also lead off air trunks, the outer ends of which open into and " below the surface of the water. These trunks serve to conduct " columns of air rearwards and direct them into the water, and " it is by the pressure of these columns of air upon the water, " that the ship is propelled in any desired direction."

[Printed, 8d. Drawing.]

A.D. 1862, November 21.—N° 3128.

NAPIER, James Robert, and RANKINE, William John Macquorn.— (*Provisional protection only.*)—" Improvements in " boilers and valvular mechanism for steam engines."

A boiler designed particularly for marine engines is made of " *four vertical* cylindrical shells with hemispherical tops," having furnaces in the lower parts of two of them. The flue from each furnace is "bent into a horizontal direction somewhere below the " water surface line," and "crosses into one of the shells having " no furnace." It then bends downwards, and "expands into " a chamber traversed by vertical tubes having the water inside " them." A flue carries off the smoke, etc. from the chamber. Or, the product of combustion may be conducted directly to the " cross flue, which may afterwards bend down." The four shells may unite in a single steam dome. The boiler may have only one pair of shells, or more than two. The boiler may consist of several cylindrical boilers placed horizontally with a longitudinal furnace space in each, separated by a partition from a chamber traversed by tubes containing the water. The gases pass through an opening at the top of the partition, and escape from the bottom of the chamber.

"The improvements in valvular mechanism relate to that class " which contains a double slide and a link motion. In an " arrangement embodying the improvements the slide next the " valve seat is moved by a pair of eccentrics and a link motion " in the ordinary manner, and the position of those two eccentrics " on the shaft is fixed with reference to the exhaust only, so as " to make it begin and end at the instants most suitable for " efficient exhaustion of the steam without regard to the admission or cut-off. The admission of the steam takes place " through a pair of openings in the first slide. The cut-off is " effected by means of a second slide behind the first slide. This " second slide consists of one plate with an opening in the middle, " or of two connected plates with an opening between them, the " two endmost edges of which opening overlap the openings of " the first slide inwards to the extent required for the lap necessary, in order to produce the expansive working. The second " slide is moved by means of a third eccentric fixed on the shaft " in such a position that the centres of the three eccentrics form " a triangle, whose acute angles at the centres of the forward " and backward eccentrics respectively are equal to the angular " advance necessary to produce the admission and cut-off required " in full forward and full backward gear respectively. The expansion is varied by means of the link motion in the ordinary " way, and thus two disadvantages are avoided at the same time, " on the one hand, the disadvantage of the common link motion " *with a single slide of* cushioning too much steam at high

other hand, the disadvan
ves motions of requiring
them than the ordinary
echanical equivalents may

vember 27.—N° 3177.

ANDRE, and PAUMIER, PIERRE
ection only.)—" A new atmospheric

eservoir on board ship, and then ex-
sed to issue under pressure below water

December 6.—N° 3276.

and BORROWS, EDWARD.—" Improve-
for ships and other navigable vessels."
paddle floats, but in form like the blades of
at each side of a vessel on a horizontal
be shortened or reefed, or may have their
according to the effect desired.

December 8.—N° 3283.

LEGGETT.— (*A communication from Wood-*
rovisional protection only.)—" Improvements
atus for obtaining and applying motive power
ther purposes."
rcular frame round the screw propeller is
ssuing from apertures in the propeller blades
ill impinge upon diagonally placed fixed

ings.]

ecember 10.—N° 3307. (* *)
This invention relates to steam boilers
tinct parts called " furnace section " and

" tube section," which communicate with each other by means of short tubular pipes for the flow of water and steam, and by short flue tubes for the passage of the products of combustion. The furnace section is square, surrounded by a water space, and surmounted by a large cylindrical steam dome about equal in diameter to the width of the furnace. The tube section is upright and cylindrical, and contains a central "flame chamber," made annular by a large vertical water tube which opens to the water space above, and centrally amongst an annular group or cluster of vertical fire-tubes below, upon which the flame chamber is supported; the upper tube plate forms the bottom of the flame chamber, and the lower tube plate the cover of a basement flue chamber, upon which this section of the boiler is superposed. The working water level is established in the lower part of the steam dome, above the level of the top of the tube section, which is always full of water kept in circulation through the furnace section by its ebullient action and the rising steam. The flaming gases rise from the fire to the crown of the furnace, and course through an upper connecting flue passage into the annular flame chamber, thence descending through the group of vertical fire-tubes into the basement chamber, whence they again rise up flues formed between the sections by enclosing plates, and then pass off to the chimney. Four external tubular bends form additional water circulating communications between the water space in the steam dome, and the top corners of the furnace shell.

These boilers in double section are arranged in series for marine purposes, and in some cases for the sake of economy a brickwork furnace is adopted, the water circulation being effected through external pipes uniting the water space of the steam dome with the lowest water spaces of the tube section.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1862, December 13.—N° 3344.

HENRY, MICHAEL.—(*A communication from Jean Pierre Victor Le Rouge.*)—" Improvements in fitting or applying propellers to " ships and other vessels."

The object of this invention is to enable the position of the propeller to be varied. It is mounted on an axis distinct from the main driving shaft, and driven by gearing. " At the stern of " *the vessel are two frames,* one fixed and the other moveable;

" the moveable frame is capable of turning on or about an upright " or vertical axis, so as to work like a rudder, and it is actuated " for that purpose by a toothed wheel or pinion gearing into a " toothed segment on the frame. The upright axis or shaft " passes through this frame and has round it a ring, boss or " collar, in which is a socket or bearing in which the end of the " propeller works. On the upright shaft is a toothed wheel in " gear with a wheel on the propeller shaft, and likewise with " a wheel on the driving shaft, by which means motion is transmitted from the latter shaft to the former, and the propeller is " thereby caused to revolve. By working the toothed segment, " the moveable frame will be turned to the required angle, and " will stand at such angle without interfering with the rotation " of the propeller." The gearing may be protected by a conical shield. To raise and lower the propeller another frame is used which slides up and down. " This frame carries the upright axis, " and is slotted through, so that it may move over the driving " shaft, and it is also slotted at top, so that it may move over the " pinion which drives the turning frame." To drive the propeller, a wheel on the driving shaft gears into " a wheel on the upright " shaft, which latter wheel allows such shaft to be raised and " lowered through it." Another wheel on the lower part of the upright shaft gears into a wheel on the propeller shaft.

[Printed, 6*d*. Drawing.]

A.D. 1862, December 24.—N° 3430.

HINDE, THOMAS CALENDER.—" Improvements in furnaces or " apparatus for generating carbonic oxide."

The carbonic oxide is used for heating marine or other furnaces. A closed chamber of brickwork is constructed with a hopper at the top. " The said hopper may be made to communicate with or be " shut off from the said chamber by means of a sliding valve " or damper. At the bottom of the said chamber are a door " or doors, which may be opened when required, but which are " kept securely closed while the furnace or apparatus is in use. " At one or more sides of the said chamber, and at about one-" third of the height of the said chamber from its bottom, are one " or more openings, into which tuyeres are inserted, and near " the top of the said chamber is a pipe, tube, or culvert, by which " the carbonic oxide produced is conveyed away to the steam " boiler or other furnace or place where it is to be burned. The

" furnace or apparatus is used in the following manner:—A fire
" is lighted on the bottom of the closed chamber, the hopper is
" kept filled with coal, which is allowed to fall from time to time
" into the chamber by the temporary withdrawal of the valve or
" damper. A blast of air from a fan or other blowing machine
" is passed through the tuyere or tuyeres into the small or other
" coal in the chamber, by which blast the decomposition of the
" fuel is effected, and carbonic oxide produced. The carbonic
" oxide so produced passes from the chamber mixed with the
" nitrogen of the air by the pipe, tube, or culvert near the top of
" the chamber, and is conveyed to the furnace or other place
" where it is to be burned, and where it is ignited in contact with
" atmospheric air. The ash may be removed from time to time
" by the doors at the bottom of the chamber."

[Printed, 10*d*. Drawing.]

A.D. 1862, December 27.—N° 3458.

FREEMANTLE, JOHN, and FREEMANTLE, SAMUEL.—(*Provisional protection only.*)—" Improvements in apparatus for propelling vessels."

The inventor says:—

"I propose to construct a paddle attached to two arms, the
" ends of which arms are connected with moveable horizontal
" beams. The arms and paddle are actuated by means of a crank
" connected to the engine shaft, and situated on the exterior of
" the vessel within the paddle box a similar paddle with arms,
" beams, and a crank being arranged on the opposite side of the
" vessel. The revolution of the cranks will carry the paddles
" downwards and backwards in a descending and ascending
" curve, and will cause them on leaving the water, to be extended
" to their foremost position on a level above the water, thereby
" avoiding contact with the surface of the water."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 29.—N° 3465.

TOLHAUSEN, FREDERICK.—(*A communication from Edward John Biddle.*)—" The use of petroleum or coal oil as fuel, and
" also for the machinery and apparatus to be employed for this
" *purpose.*"

"This invention relates to the use of petroleum or coal oil as " fuel, more especially for generating steam for operating machinery, also to tanks for containing, and a furnace for burning " the oil, and to apparatus or machinery for conveying the same " to the furnace as rapidly as may be desired. The furnace, which " may be of any suitable size and shape, is constructed of ordinary " materials. Instead of a grate or bars now used, the bed of the " furnace is constructed solid to prevent the escape of the fluid. " This bed may be made either smooth or corrugated. The " draught is obtained through a grating in the side or end of the " furnace which admits the air but confines the flame, and an " additional supply of air comes to the flames through pipes " terminating within the walls of the furnace. The oil enters the " furnace at the bottom, and is at first ignited by surrounding " the mouth of the pipe through which it passes with a small " quantity of burning coals. A cap may be placed over the " furnace for protection in case the flame should escape through " the gratings. Tanks for holding the oil are provided with pipes " which permit the escape of explosive gases and renders the use " of this oil perfectly safe. These tanks are connected with each " other and with a distributing reservoir by pipes of suitable size. " A steam or hand pump may be employed to draw the oil from " the tanks to a distributing reservoir. From this reservoir, " which is situated in a higher plane than the bottom of the " furnace, the oil passes into the furnace, the flow being regulated " as may be desired by a stop-cock which is governed by the " pressure of steam or by hand. A waste pipe carries back any " surplus that may accumulate in the distributing reservoir to " the tanks."

These furnaces may be used for marine and other engines.

[Printed, 10*d*. Drawing.]

1863.

A.D. 1863, January 8.—N° 66.

GROGAN, Roderick.—(*Provisional protection only.*)—"New " and improved propellers for vessels driven by steam or other " *power.*"

Vanes are so geared to the propeller shaft, as to have a feathering motion imparted to each, while it has also a rotatory motion round the shaft as an axis. A blade or rudder is likewise to be worked for propulsion as well as steering, but the manner is not particularly described.

[Printed, 4*d.* No Drawings.]

A.D. 1863, January 12.—N° 98.

MAHON, Arthur Irwin.—(*Provisional protection only.*)—" Im-" provements in screw and paddle propellers, and a submarine " propeller, also applicable to the raising and forcing of water or " other fluids."

1. Any number of small planes are placed "along radial arms " at angles on the screw principle, but bent at the edges."

2. To form a cylindrical screw:—" On the band forming the " hollow cylinder, the pitch lines of the screw are traced, and a " portion or portions of the band along the screw lines is cut, so " that it can be turned in when the band is brought round in a " cylindric, conical, or other form; there are a series of spiral or " screw openings on the outside, and of screw threads or spirals " turned in the openings thus made run along the top or back of " the threads." Any number of these cylinders may be enclosed one within the other. It may work at the stern or the sides of the vessel.

3. The blade of a screw, or the floats of a paddle wheel, are perforated to allow the water to pass through.

4. A screw is cut with a number of small blades on it, so that the diameter of the screw need not exceed that of the shaft.

5. " A plane of any form, almost surrounded by parts which, " taken together, act on the screw principle be they each ever so " minute," is "placed transversely to the axis or shaft." The best form is said to be " an ellipse surrounded by parts such that, " were all in one plane, a parallelogram covering all would touch " the axis major and minor of the ellipse, all the parts forming " the parallelogram except the ellipse to be cut in towards the " ellipse, and each of the minute parts thus created turned, at the " same time keeping up a relative pitch towards the vertices of " the ellipse."

6. A propeller is described formed with blades or floats. Shields are managed so as to cut off the water from any part of the pro-

peller that may be desired to steer or back the vessel. "It is " intended to apply this principle to the present paddle."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 20.—N° 174.

SMITH, James, and CHEASE, Sydney Arthur. — (*Provisional protection only.*)— "A new description of motive-power " engine."

The engine is of the hydraulic species, and consists of tanks and hollow plungers or floats acted upon by water regulated by valves with suitable gearing, and working through rods and cranks.

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 27.—N° 238.

GREEN, Richard Augustus Willoughby.—(*Provisional protection only.*)—" Improvements in light rowing boats, usually " termed wager boats."

A wager boat is described. With regard to the propelling part, the inventor says, " I use outriggers for the support of the " oars or sculls," "but instead of the simple rowlock in which " the oar or scull rests, I enclose it at the upper part and mount " in it an oscillating rowlock, in which the oar rests, the points " of oscillation being above and below and in a vertical line, or " nearly so, with the bearing against which the oar pulls."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 28.—N° 249.

COOK, Henry Oceanus, and TERREY, Elijah George.— " Improvements in propelling ships and vessels, and in apparatus " employed therein."

Four vanes of curved form are attached to a tube or guide rings, so as to revolve about a vessel's mast by the action of the wind, and to work propellers or pumps by cog-wheels and gearing. The vanes are kept extended by stays, so that if these are removed the apparatus can be folded close to the mast.

[Printed, 8*d*. Drawing.]

A.D. 1863, January 28.—N° 250.

MACE, Charles.—" Improvements in steam engines for pro- " pelling vessels and for other purposes."

The inventor says:—

"The first part of my invention relates to a novel arrangement
" of the parts of inverted cylinder direct-acting marine screw
" engines in combination with surface condensers.

"I construct direct-acting screw engines with inverted cylinders,
" and frame them together, and support them in the following
" manner:—I introduce in the main bed of engines a hollow box
" frame of a suitable form, and of sufficient size to receive the
" arrangement of horizontal tubes forming a surface condenser.
" In this condenser the tubes are placed horizontally, or but
" slightly inclined, and are in each case disposed in a line with
" the keel of the ship. It is preferred that the circulation of the
" condensing water should be by mechanical means, and be
" through the thin metal tubes of the condenser, while the steam
" is brought in contact with the exterior surfaces of such tubes.
" The side or bottom surface condenser forms the bed of the
" engine. The columns which support the cylinders are placed
" over the condensers. The air pumps are worked from the top
" of the piston rods, by means of cross heads and descending
" rods. The air pumps are formed in the columns that support
" the cylinders, and the descending rods work through stuffing
" boxes at the top end of columns.

"I also, according to my invention, supply a novel method of
" fastening the tube ends by two copper or brass tube plates,
" drawn together by screws and perforated to receive the tube.
" The holes are countersunk between the two plates to admit
" india-rubber rings between the tube plates. A ring is placed
" around each tube, so as to press against the tube, and make
" a water-tight joint, allowing the tube at the same time to
" expand or contract free from any strain.

"I also introduce an ordinary injection pipe, which allows the
" engine to be worked efficiently as an ordinary injection engine;
" condensers similarly constructed are applicable to paddle and
" other engines."

[Printed, 1s. 10d. Drawing.]

A.D. 1863, January 28.—N° 252. (* *)

WYMER, Francis William.—This invention relates to the construction of high and low-pressure steam engines. Three arrangements are shown. The first described exhibits a high-*pressure cylinder of small* diameter superposed centrally upon a large low-pressure cylinder. The high-pressure piston rod carries a cross head, to the ends of which the low-pressure piston rods are attached; these two rods are diametrically disposed, sufficiently far apart from the centre of their piston, to clear the outside of the high-pressure cylinder; their lower ends pass out of the bottom of the cylinder through stuffing boxes, and are fixed to the ends of a cross head, which slides between guides attached to the framing, and to which the connecting rod (coupled to the crank shaft below) is jointed. The frame whereon the cylinders are mounted is hollow, suitably formed and internally furnished to receive the exhaust steam from the low-pressure cylinder, and dispose of it either by surface or injection condensing. The air and water pumps (driven by means of a lever from the lower cross head) are fixed to a suitable foundation or bed plate, outside the hollow framing, which is also bolted thereto. The steam at high pressure first operates in the high-pressure cylinder, which exhausts through suitably arranged passages into the low-pressure cylinder, and passes thence into the hollow supporting frame, where it is condensed. In another example, the conjoined cylinders are inverted, and disposed beside each other. The piston rods operate a beam, which is supported in bearings attached to the hollow framing, and the connecting rod gives motion to the crank shaft from the other end of the beam. Other arrangements describe the cylinders horizontally disposed, as designed for marine propulsion. The valves are of the ordinary kind, actuated by eccentrics on the crank shaft, and fitted with reversing gear.

The patentee states that the engines described are especially applicable for driving screw propellers.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1863, February 6.—N° 334.

JOHNSTON, ALEXANDER.—"Improvements in the propulsion "of vessels."

Cylinders fixed in the bottom or sides of a vessel, have solid plunger pistons caused to move to and fro, and thus to act upon the water and propel the vessel. Their weight is so to be adjusted in relation to their volume, as to cause little strain upon the cylinder by the floating power of the water when they are protruded from the cylinders.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1863, February 17.—N° 429.

FORD, William Charles.—(*Provisional protection only.*)—"An improvement in paddle wheels."

The floats of a paddle wheel are arranged two on one arm and one on the next arm, so as to ply in a circle intermediate between those on the first arm. The floats may be of prismatic form and hollow, with a hole for access to the inside, and with flanges for fastening to the arms.

[Printed, 4*d.* No Drawings.]

A.D. 1863, February 28.—N° 571. (* *)

SYMONDS, Thomas Edward.—"Improvements in the construction of screw-propelled ships, and in the arrangement and mode of disconnecting, withdrawing, and lifting screw propellers."

"This invention relates to twin or double screw ships built of iron, and having one or more keels, each screw being overhung or having no outer bearing.

"In constructing ships according to this invention, I form or insert two transverse bulkheads across the stern part of the ship, the aftermost of these bulkheads being immediately before the screw, and I form a wellhole for receiving each screw under the counter, and abaft the transverse bulkhead.

"For the purpose of enabling overhung screws, according to this invention, to be raised vertically, I mount or fix each screw upon a short length of shaft, which is supported by and free to revolve in, a long bearing formed by two half carriages, which when brought together form a tube, which may be filled with lignum vitæ strips or other bearing and wearing surfaces. These half frames when combined form the carriage, which, sliding in a vertical frame or guides between the transverse bulkheads, enables the screws to be raised vertically, so that the ship may sail without the obstruction offered by the screw propeller. Each screw may be raised separately. The inner end of the short shaft, upon which the screw is mounted, may be fitted with the ordinary form of cheese-head coupling. The withdrawing the screw from the water, or the raising and lowering, may be effected by means of chains or ropes and pulleys, or any other of the well-known mechanical means may be adopted for that purpose. The foremost of the transverse bulkheads is

" fitted with a stuffing box for the screw shaft, and one part of " the cheese-head coupling projects therefrom. The apertures for " the screws are fitted with flaps or shutters opening outwards " (or they may be made to slide), for the purpose of closing the " opening at the bottom of the screw hole, so as to insure a clear " delivery of the water, whether under steam or sail. The over- " hanging end of the screw or one of the blades, may have a hole " cast or formed therein for the purpose of enabling the screw to " be 'fished,' or to assist in withdrawing it or hauling it up.

"For the purpose of withdrawing the overhanging screw hori- " zontally from off the screw shaft in double screw vessels, I " form the after end of the screw shaft in the following manner:— " I make the shaft at the outer end sufficiently large to enable " it to be bored or otherwise made hollow, for the purpose of " receiving the shank of the screw, or a short length of shaft upon " which the screw has been fitted, and by means of a gib and " cotter passing through slots formed in both the screw shank or " shaft and the hollow part of the main shaft within or forward " of the stuffing box, or between the outer and inner bulkheads, " or forward of the stern bearing; thus the key or other means of " securing the overhanging screw in its place may be withdrawn " and the screw released.

" By the arrangement of bulkheads forming the after termina- " tion of the hull in the manner described, I am enabled to give " additional strength to the ship as a structure, and by the " arrangement and disposition of the stern part externally, and of " the rudders in double-keeled vessels, I am enabled to avoid the " necessity for any after stern post, upright, or framing piece " abaft the screw propeller, or any opening or void, such as exists " in ships of war and other vessels, between the fore and after " stern posts, which impairs the steering qualities of the ship.

"In iron screw vessels having double keels, I place a rudder in " the line of each keel, and nearly in a line with each screw shaft, " and I connect the tillers together so as to enable them to work " simultaneously, but they may be readily disconnected for the " purpose of being worked separately."

[Printed, 8*d*. Drawing.]

A.D. 1863, February 28.—N° 572.

PENN, JOHN.—" Improvements in escape or relief valves to the " *cylinders of marine* and other steam engines."

Instead of the escape relief valves being heavily loaded as at present, so as to be able to resist the greater pressure of steam in expansion engines when suddenly reversed, the valves are kept closed by steam on the outer face (which is larger than the inner one) in connection with the steam pipe. The action therefore is that when the steam in the cylinder presses much more than that in the steam pipe, the valve opens, and the escape steam passes into the steam pipe, but if there be water in the cylinder it escapes through the valve into a vessel, from which it may be withdrawn by suitable means.

[Printed, 1s. 2d. Drawings.]

A.D. 1863, February 28.—N° 574.

HAYES, Edward.—"Improvements in supplying water to "surface condensers of marine engines."

"In carrying out this invention any description of surface "condenser may be employed which requires a constant current "of condensing water flowing to and from it; the condenser is "placed below the water line of the ship or vessel, so that a "current of water may flow readily to it, the inlet pipe passing "out of the vessel below the water line. When a screw propeller "is used, the outlet pipe is led to the stern of the ship or vessel, "so that its end comes in front of the screw propeller, and is by "preference brought to a point below that at which the screw "shaft passes from the vessel. The partial vacuum caused by "the action of the screw propeller will constantly draw a current "of water through the outlet pipe from the condenser, and thus "allow a constant stream of water to flow into the condenser "through the inlet pipe."

[Printed, 4d. No Drawings.]

A.D. 1863, March 3.—N° 596.

LAMB, George.—(*Provisional protection only.*)—"Improve-"ments in apparatus for recording the revolutions of the pro-"pelling shaft of a steam ship or vessel."

A strip of paper is wound at a uniform speed from one axis to another, and marked at intervals by mechanism in connection with a chronometer. It is also marked by an apparatus worked by the propeller shaft. Separate marking apparatus is employed when the engines are reversed.

[Printed, 4d. No Drawings.]

A.D. 1863, March 9.—Nº 653.

HUGON, Pierre.—" Improved machinery for obtaining and " applying motive power."

For the direct action of ordinary gas engines an indirect action is substituted, by causing the explosive force of the gaseous mixture to act upon an intermediate column of water, and thus indirectly upon the piston. " The cylinder in which the piston " works is separated from the tubes wherein the explosion takes " place; the power resulting from the dilatation of the gases is " employed to expel a certain quantity of water from the explo- " sion tube and to produce a vacuum, the effect of which is added " to that due to the condensation of steam arising from the com- " bination of the hydrogen and oxygen, and can be utilized in the " cylinder." The reservoirs are so arranged that the " same " water always circulates in the engine, and that that which has " been expelled from the tube, fills the cylinders on the side " opposite to the chamber, which is at the moment in connection " with the vacuum produced. The cylinder being originally full " of water, it is the exhausting towards the vacuum of the " liquid contained in one of the chambers which produces the " movement of the piston; the water expelled from the tube " which fills the opposite chamber, the capacity of which " increases gradually, acts in the same manner at the following " explosion." By this means the shock of the explosion is not transmitted to the motive parts. " The utilization of the vacuum " is rendered as perfect as possible by the presence of water in " all parts of the engine, for it is never filled except by columns " of liquid, the movement of which determines that of the " piston. Water enters every part of the engine, it is water " which displaced by water when the explosion takes place makes " the vacuum as perfect as possible."

[Printed, 2*s.* 10*d.* Drawings.]

A.D. 1863, March 13.—Nº 685.

STÜBBE, William Hermann.—(*Provisional protection only.*) —" Improvements in governors for marine and other engines."

The governor ball apparatus of the ordinary character, in which two balls suspended by rods rotate about a common axis and rise or fall according to their speed, is hung upon gimbals so as to act when used on board ship and disturbed by the motion of the sea.

Motion is given to the axis through a bevelled wheel upon it, and another on a shaft passing through one of the axes of the gimbals.

[Printed, 8*d*. Drawing.]

A.D. 1863, March 16.—N° 707.

SMETHURST, John.—(*Provisional protection only.*)—" Im-" provements in the construction of ships and vessels for the " purpose of obtaining additional strength and motive power."

The vessel is built with "four distinct keels." The space between the two centre keels is much larger "both in height and " width" than that "between the outer and centre keels." Paddle wheels are placed in this central space having engines on both sides. Smaller wheels may be placed in the outer spaces, worked by separate engines. These may act instead of a rudder. Or the main paddle wheels may be placed in the outer spaces; or the ship may have three keels, with the wheels beside the centre keel; or two keels, and the wheels between them.

The ship may be made with "an inner shell," the spaces between the inner and outer shell being divided into compartments. These compartments are connected with the exhaust steam pipe, and used as surface condensers. The exhaust steam may also be discharged into a vessel partly filled with water, this vessel being connected with the condensers.

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 31.—N° 825.

SMETHURST, John.—" Improvements in steam engines and " boilers, part of which improvements is applicable to heating " purposes."

A compound boiler is employed, consisting of an inner and outer shell. The steam from the former supplies a high-pressure engine, the exhaust steam from which passes through pipes to another high-pressure cylinder or to a condenser, or to the outer shell of the boiler, whence, with the steam generated therein, it goes to another high-pressure cylinder, and thence to a low-pressure cylinder, or to a condenser. Descriptions of the invention are given as applied to locomotives and stationary engines, and the Provisional Specification states that it is applicable to marine engines.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1863, March 31.—N° 831.

COE, ERNEST OSWALD.—(*Provisional protection only.*)—"Improvements in propellers for ships and other vessels."

Instead of a paddle wheel with floats, the wheel is to be formed with corrugations radiating from the centre to the circumference.

The wheels "may have their planes either at a right angle with " the line of the axle, or inclined outward from centre to circumference at any required angle."

More wheels than one may be used on the same shaft.

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 1.—N° 842.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from Edward Dickerson.*)—"Improvements in steam boilers."

"The improvements in boilers consist in combining tubes, " through which the water passes, and which are in the furnace, " with tubes through which the products of combustion pass, " and which are surrounded with steam, or with steam and water, " so that after the heat of combustion has partly spent itself in " heating the water which passes through the water tubes, it will " superheat or dry the saturated steam which is evolved from " the water tubes, thereby commanding the highest evaporating " power in the smallest compass, and with the greatest facilities " for cleaning and repair. This fire-box or furnace is made with " a water space on all sides, through one of which sides the " opening or openings are formed where the fire-door or doors " are applied, the fire-bars or grating on which the fire is made " being situated below the fire-door or doors. The water spaces " which surround the furnaces contain the greater part of the " water used. The water tubes which run through the furnaces " may be curved or straight, as desired. The products of combustion pass through the steam or superheating tubes to the " up-takes, which may be of any form or material. Suitable doors " or plates are applied, which can readily be removed from the " boiler, and which, when removed, expose the ends of the water " tubes to inspection. The steam pipe through which the steam " is drawn off from the boiler, should be rivetted on the shell so as " to cover perforations, through which the steam may pass from " the boiler to the pipe. There is a space between the upper row " of water tubes, and a man-hole should be made to permit

" a man to enter into this space, so that he may come to the " lower ends of the steam tubes when desirable. By these " arrangements three of the four ends of the two sets of tubes " are accessible from without the boiler, and the remaining end " of the steam tubes is easily got at from the furnace by a man- " hole."

[Printed, 10*d.* Drawing.]

A.D. 1863, April 8.—N° 887.

HARRIS, JOHN REEVES.—(*Provisional protection only.*)—" Im- " provements in propelling vessels."

The propellers consist of wheels with compartments with one open side turned outwards, and they are so enclosed within boxes, that only the part in propulsive action is exposed while the wheel rotates.

[Printed, 4*d.* No Drawings.]

A.D. 1863, April 8.—N° 888.

GEDGE, WILLIAM EDWARD.—(*A communication from Hilaire André Levallois.*)—(*Provisional protection only.*)—" Improvements " in apparatus for propelling and navigating small craft."

The invention comprises several modes of using reciprocating motion for oars.

(1.) The oar blade is connected to the shaft by a conical socket, and works in a ferrule jointed so that the blade may be depressed.

(2.) The shaft of the oar is divided inward so as to be worked by sector toothed wheels and rods, while the oarsman is at any part of the boat and facing forward or aft. An up-and-down movement is given by hinges.

(3.) A shaft carrying several paddles is caused to rotate in the water, and a balance weight upon it is then brought into action so as to lift the paddle blades out of the water by raising the outer part of the shaft.

(4.) A "rudder oar" is constructed so as to be lifted for the return stroke by self-acting apparatus put in motion by the to-and-fro action of rods and a chain. This is effected by a lever, crank, pulley, and flat pieces, of which the construction is not particularly described. This oar will have effect in steering by turning it to one side or the other as may be required.

[Printed, 4*d.* No Drawings.]

A.D. 1863, April 18.—N° 975.

BURDEN, William Benoni.—(*Provisional protection only.*)—
" Improvements in wheels and axles, applicable to locomotives, " carriages, and paddle wheels."

With relation to the shaft of paddle wheels, it is to be inclined to the horizon at an angle of nearly 17°, and the wheel is to be so made that the spokes are nearly vertical when at the lowest point.

[Printed, 4*d.* No Drawings.]

A.D. 1863, April 21.—N° 990.

RUNKEL, Mark.—(*A communication from Henry Behrens.*)—
" Improvements in marine steam engine governors."

The ordinary double-balled pendulum governor is suspended so as to work in gimbals, and thus to be independent of the vessel's disturbed motion. The engine transmits force to the governor, causing it to revolve, by means of three bevelled wheels geared in two sets. The end of the rod affected by the rising of the balls, is at the common centre or inclination of the three axes of these when the rotation of the balls is at a mean velocity, and loose upon this (or connected by a universal joint) pressed to it by a spring is the rod which transmits the regulating motion to the throttle valve.

[Printed, 1*s.* Drawings.]

A.D. 1863, April 30.—N° 1093.

APPLEBY, Joshua.—" Improvements in propelling ships and " barges."

The vanes of paddle wheels are inclined to the plane of rotation (as in screw propellers), and two or more with the inclination in different directions, are applied at each side of a vessel.

In another arrangement one or more rings are added to the revolving blades to restrain the outward flow of water.

[Printed, 10*d.* Drawing.]

A.D. 1863, May 7.—N° 1146.

DAY, Charles Arthur, LAMB, Andrew, and SUMMERS, Thomas.—" Improvements in marine engines."

The ordinary suction air pumps of steam engines, are used *for surface* condensation, so that one of the pumps draws the condensed water from the cylinders, discharging it into the boiler, and another draws the used condensing water from the surface condenser, discharging it into the sea. Valves and cocks are arranged to regulate the entrance and flow of the water.

[Printed, 1*s.* Drawings.]

A.D. 1863, May 7.—N° 1147.

THIERRY, Jean Baptiste Pierre Alfred.—" Improvements " in the arrangement or construction of furnaces to render the " combustion of the fuel more complete, and to prevent the " emission of smoke therefrom."

Jets of superheated steam are blown in against the bridge of the furnace, the steam to be at a temperature between 300° and 600° Fahr. Atmospheric air may be blown in by placing an open pipe beside the steam jet. The steam may be superheated by means of a worm in the furnace, or by a separate apparatus. By preference, the steam is drawn from the steam-chest, and led through pipes to the superheater. Caps of platina, porcelain, or fire-clay may protect the end of the blowing tube.

In steamers " a hollow cross bar with ways for the jet pipes of " the blow pipe, is lodged inside the front casing of the boiler " over the fire-door, and when it is requisite to apply the blast, " the jet tubes are merely placed through the ways in the cross- " bar, the end of the feed-pipe being then screwed on either end " of the blow-pipe, or on to a branch in the centre or other part " of said pipe. The blow-pipe is provided with suitable means " of cleaning the jets." " When dry steam has to be supplied " to several fire-places, as in the case of marine engines," " the " apparatus consists of a worm " enclosed in a metallic casing, and heated by a fire below the middle of the worm. Steam passes through the worm to be superheated. The worm has an exhaust valve for regulating the supply of steam.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1863, May 18.—N° 1243.

HEATHER, Alfred, and REDFERN, John.—" Improvements " in the construction of steam boilers for marine, locomotive, and " stationary engines."

Improvements upon No. 495, A.D. 1860.

The *perforated plate* of a multitubular boiler is bent or curved, instead of presenting a plane face, so as to promote circulation of the heated air and favour combustion of smoke.

In some instances there is a central flue open at each end.

Boilers are made to be fired at both ends.

A fire-door made of several parts, one of them perforated and with a valve regulated for the proper supply of air, is so constructed as to keep more cool than other plans.

[Printed, 3*s.* 4*d.* Drawings.]

A.D. 1863, May 26.—N° 1324.

HENRY, MICHAEL.—(*A communication from Louis Coignard.*) —" Improvements in apparatus for raising, forcing, and moving " fluids."

" A spherical or ellipsoidal drum, wheel, or vessel, revolves on a " vertical axis within a fixed casing, which fits close round it, " but without friction between the fixed and moveable surfaces. " The fluid enters the drum or wheel at the poles or ends, through " which the axis passes, and escapes through a narrow annular, " circular, or circumferential slot formed in its periphery; the " plane of this slot is at right angles to the axis of rotation; this " slot leads into a corresponding slot in the casing, whence the " fluid issues into a close receiver or annular pipes. The annular " slots are packed or fitted with leather or other flexible lips, " bands, washers, or rings. The outlets may, however, be at " some other part of the circumference; they may be formed by " an arrangement of spiral or excentric curved vanes." " Spiral " deflecting guide plates are fitted in the suction ways, to com- " municate to the fluid the direction of the vane's motion. The " boss of the drum or wheel may be extended into the suction " pipes, and one or more of the vanes may be prolonged and " carried spirally round the axis, or the ends of the drum may be " packed with washers, each washer having four (or more or " less) oblong or oval slots, whereof each is respectively cut in a " transverse direction to the corresponding slot of the washer " next over it. Pins are passed through these slots, and the " washers are controlled by springs. The vanes may be of such " form that the commencement of their convex surfaces shall be " tangential to the circumference of the boss, and the end of " their concave surface to that of the wheel or drum."

This Specification is referred to in No. 550, A.D. 1864.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1863, May 28.—N° 1340.

CARTWRIGHT, Henry.—“ Improvements in apparatus for “ steering vessels.”

The invention relates to a method of working rudders or screw propeller frames for the purpose of steering. A screwed rod passing through a nut is pivotted on the inner end of the tiller or lever fixed to the propeller frame. The rod is connected at the end by a universal joint to a driving shaft. As the shaft revolves, the screwed rod is turned, and works the lever.

“The nut on the end of the tiller or the lever is mounted on
“ two pivots, one at the top and the other at the bottom fixed in
“ suitable bearings, in order to allow for the variations in the
“ position of the tiller or the lever as it is acted upon by the
“ screw or screwed rod, and a slot and pin or other suitable con-
“ trivance are adapted to the box or carrier for the nut, and the
“ end of the tiller or the lever to which it is applied for the pur-
“ pose of preventing any undue strain upon either one of the
“ pivots owing to any deviation of the tiller or the lever from
“ the horizontal. The driving shaft may be variously driven,”
but the inventor prefers “ a short shaft mounted in bearings on
“ a frame fixed to the deck, and to drive it from another short
“ shaft mounted in the same frame, to which second shaft is con-
“ nected a small donkey engine for the purpose of working it;
“ the two shafts being connected by two cog wheels, which”
may be made “ of different diameters for the purpose of adapt-
“ ing the speed of the engine to that of the screw, as may be
“ required.”

[Printed, 8*d*. Drawing.]

A.D. 1863, May 28.—N° 1346.

BROOMAN, Richard Archibald.—(*A communication from Gustave Sahler.*)—“ Improvements in paddle wheels.”

Instead of flat paddle floats, the patentee employs curved corrugated surfaces, which being attached to an arm of the wheel in one plane, bend round to the next arm in another plane and then back to the first plane.

The form of the part which acts on the water is a “helicoidal” surface.

An enlarged keel enables one of these wheels to be placed at each side between it and the hull of the vessel, but the manner of doing this is not described.

[Printed, 8d. Drawings.]

A.D. 1863, June 8.—N° 1427.

PAGE, Thomas.—(*Provisional protection only.*)—"Improve-"ments in propelling vessels and in apparatus for the same."

The number of floats on a paddle wheel and their size are so regulated that they are driven through the water with more than usual velocity.

The shaft and wheels are on adjustable bearings, so as to be raised and lowered for any required degree of immersion.

[Printed, 4*d*. No Drawings.]

A.D. 1863, June 9.—N° 1437.

NEWTON, William Edward. — (*A communication from Frederick Warren Harris.*)—(*Provisional protection only.*)—"Im-"provements in the propulsion of ships and other vessels."

A screw propeller works in a tubular passage underneath a vessel's hull which has funnel-shaped ends so large that the area for passing water through, is nearly equal to that of the greatest submerged section of the hull.

Stationary blades or wings keep the column of water from receiving a rotary motion, or another propeller may work thereon for this purpose in an opposite direction.

The tube is so arranged as to be embodied with the form of the vessel and to present the sharpest possible point for passage through the water.

[Printed, 4*d*. No Drawings.]

A.D. 1863, June 11.—N° 1449.

CLARK, William.—(*A communication from Antoine Merlanchon.*) "Improvements in obtaining and applying motive power, and "in apparatus for the same."

"This invention has for its object the transformation of heat "into motive power, employing water as a medium.

"It consists, first, in producing heat by combustion under "pressure in a closed chamber of suitable combustible materials "introduced at the back on the incandescent fire, which com-"bustion is quickened by the application of a forced air current "supplied in suitable proportions to the furnace.

Further, instead of the heat produced vaporizing the water "*and superheating* the steam by direct contact," it acts "on "*the water in* a sub-divided state by projecting the latter

" against suitable surfaces in a contrary direction to that in
" which the current of heated gases passes. I introduce this
" mixture of heated gases and superheated steam, which is
" renewed at each stroke of the piston, into a cylinder or receiver
" similar to those of ordinary steam engines, but specially
" arranged according to this invention. The apparatus is com-
" posed of two principal parts: 1st, the generator or furnace;
" 2ndly, the receiver or engine. The generator is formed of two
" tight compartments communicating at the lower part; one
" contains the fuel, and the other is that in which combustion,
" evaporization, and the superheating processes are effected.
" This generator also receives air from the receiver, which is
" supplied to the furnace by means of cocks. These cocks regu-
" late the temperature, which is indicated by an instrument
" acting by the difference of expansion between a tube placed in
" the generator and a nondilatable body contained in said tube.
" This generator receives water from the pressure reservoir, the
" supply of which is regulated by means of suitable stopcocks.
" Air-tight doors closing with screw plugs are applied for the
" introduction of the fuel and removal of scoria. The heated
" gases and steam are supplied to the receiver by means of cocks.
" The receiver consists of two engines coupled together, each
" having two cylinders, the steam passing from the first to the
" second cylinder, in which expansion takes place. Each engine
" is furnished with a feed pump for supplying air to the gene-
" rator, and a pump for supplying water to the reservoir. The
" engines are specially arranged for the employment of high
" temperatures, having blow-off cocks with continuous action;
" the packings of the rods have metal friction surfaces applied,
" lubricated in a peculiar manner, out of reach of the action of
" the currents."

"The pumps supply a compressed air reservoir kept con-
" stantly at a higher pressure than that of the generator, which
" is effected by means of a self-acting regulator acting by the
" pressure of the reservoir on the suction of the water feed
" pumps. The pipes conveying the water from the reservoir to
" the generator are furnished with a suitable arrangement of
" cocks."

The various parts are all described very fully, and at considerable length.

[Printed, 5s. 4d. Drawings.]

A.D. 1863, June 12.—N° 1475.

TONE, JOHN FURNESS.—(*A communication from Henry David Furness.*)—(*Provisional protection only.*)—" Improvements in the " prevention of smoke in steam boilers and other furnaces."

In adapting the invention to a marine boiler a steam pipe is carried from the boiler through the smoke box, where the steam is superheated. Thence it passes to a pipe underneath the grate bars, through which the steam is injected, carrying with it a current of air against the back part of the fire.

[Printed, 4*d.* No Drawings.]

A.D. 1863, June 15.—N° 1491.

BOX, WILLIAM WILLIAMS.—(*Provisional protection only.*)— " Improvements in fire-bars for the boilers of locomotive and " other engines, and for fire-boxes and furnaces generally."

The bars are made hollow with screwed ends. Screwed elbows connect them together in pairs alternately at each end, in such manner that the water traverses the whole system of bars, flowing backwards and forwards along the bars. One end of the series is pivotted, and the other may be raised and lowered by suitable means. At the ends of the bars which are not coupled together they are fastened by solid pieces.

This Specification is referred to in No. 3165, A.D. 1863.

[Printed, 6*d.* Drawing.]

A.D. 1863, June 20.—N° 1544.

MEIRAT, YENN.—(*Provisional protection not allowed.*)—" Pro- " pelling vessels of every description and size by water power."

" The water to be admitted into an opening or openings at the " bow or forward part of the vessel, flowing through a tube or " tubes into a reservoir, and acting upon machinery which gives " motion to screws or paddle wheels, and thereby propels the " vessel."

[Printed, 4*d.* No Drawings.]

A.D. 1863, June 20.—N° 1556.

WINANS, WILLIAM LOUIS, and WINANS, THOMAS.—" Im- " provements in couplings for propelling shafts of ships or " vessels."

In order to allow a certain amount of play between the parts *of a shaft which* has been displaced or bent from its proper axial line, each part is so cut and fitted that cross pieces take into each other. So long as the shaft is properly straight, there will be no relative motion between the parts, but when the shaft is strained or bent, the moveable parts will slightly "give" while they still grasp each other and transmit motion.

The action is somewhat similar to that of coupling boxes when in full gear, with their surfaces modified so as to keep them close when the axes of the two rotating parts of the shaft are not coincident.

[Printed, 10d. Drawing.]

A.D. 1863, June 20.—Nº 1557. (* *)

WINANS, William Louis, and WINANS, Thomas.—"Im-" provements in adapting propellers for propelling ships or vessels " for ocean navigation." The invention consists in "the adapta-" tion to and combination with a spindle-shaped hull, such as " was invented by Ross and Thomas Winans, and patented 19th " June 1858, No. 1386, of a screw propeller placed at one end of " the vessel, or two screw propellers, one placed at each end of " the vessel. It likewise consists in the adaptation and combina-" tion of like propellers to a spindle-shaped hull in combination " with a flat or nearly flat upper deck, with bulwarks, railing, or " cabin similar to that invented by us, and for which we have " applied for Letters Patent. The longitudinal centre line of " the shafts of these propellers coincides, or nearly so, with the " centre line or longitudinal axis of the vessel, so that one-half " or nearly one-half of the propeller or propellers will be out of " the water. The external surface of one end of the hub of the " propeller corresponds with the outside diameter of the end of " the hull of the vessel, and the other end of the hub is continued " to a point, thereby completing the spindle form of the vessel."

"When one propeller is used, we would prefer, for greater facility " of steering, that it should be placed on the forward end of the " vessel, with one of the rudders of large size a short distance in " rear of the propeller, in order to partially counteract the ten-" dency of the end of the vessel to move laterally by the action " of the propeller."

" We propose, in some cases, to employ one or more fins, pro-" jecting down from the hull a short distance astern of the wheel,

" so as to counteract partially the tendency of the end of the " vessel to be pressed laterally by the action of the propeller."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1863, June 20.—N° 1558.

WINANS, William Louis, and WINANS, Thomas.—" Im- " provements in adapting propellers for propelling ships or " vessels for ocean navigation."

Two screw propellers are used, one at each end of the hull. They are of the usual shape, but of larger diameter, so that a portion of the propellers will project above water when the ship is fully loaded. The forward and after lines of the vessel below the water-line may be made "to conform to or blend with the hubs of " the propellers, which hubs for this purpose are enlarged."

[Printed, 10*d.* Drawing.]

A.D. 1863, June 22.—N° 1570.

WINANS, William Louis, and WINANS, Thomas.—" Im- " provements in adapting propellers for propelling ships or " vessels."

An improvement on No. 1387, A.D. 1858, which refers to a spindle-shaped hull. To this hull two screw propellers are adapted. It is formed of three compartments of which the middle one is " much the largest."

The propellers are placed one at either end of the central compartment. About half each propeller is immersed. They are similar to the one propeller described in No. 1837, A.D. 1858, but are not described in this Specification.

The engines are in the middle compartment. The propellers may be upon the same or separate shafts, and worked by the same or separate engines. By driving the propellers in opposite directions, the ship may be made to rotate.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1863, June 22.—N° 1571. (* *)

WINANS, William Louis, and WINANS, Thomas.—" Im- " provements in adapting propellers for propelling ocean steam " vessels." The invention relates to certain improvements upon an invention for which Letters Patent were granted 19th June

1858, No. 1388, to Ross and Thomas Winans. The invention therein-described was a combination of a vertical transverse trunk within the hull of a vessel of ordinary form, or such form, slightly modified with a screw propeller of large size, or two screw propellers placed side by side, whose blades project beyond the outside of the hull. The present invention consists in the combination for ocean steamers, of the ordinary type of hull, of two vertical transverse trunks, one placed towards each end of the vessel, with two screw propellers, one placed in each trunk, of such large size that the blades shall project above the surface of the water when the vessel is fully loaded.

As a modification of the above arrangement, two propellers may be combined with vessels, the hulls of which are so modified towards the ends as to conform more nearly in form to the hub of the propellers under and for a convenient distance above the water line. The machinery or engine for driving the propellers is to be placed between them. In some cases both propellers may be mounted upon the same shaft, and the engines may be made to actuate both propellers simultaneously. In other cases the propellers may be mounted on separate shafts, and actuated by separate engines, so that the propellers may be used singly, or be driven either in the same or in opposite directions.

[Printed, 10*d*. Drawing.]

A.D. 1863, June 22.—N° 1572.

WINANS, William Louis, and WINANS, Thomas.—" Improvements in the construction or arrangement of the working " parts of engines for actuating the propelling shafts of steam " vessels."

The piston has two piston rods, and these are united by a cross head which carries a connecting rod on each side of the cylinder so as to work a crank on a shaft passing across the cylinder and between the two piston rods.

The patentees recommend the use of the mode of coupling shafts described in No. 1556, A.D. 1863.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, July 6.—N° 1676.

CROFT, John McGrigor.—" Improvements in propellers for " *propelling vessels.*"

Instead of flat floats from one set of arms of a paddle-wheel to the other, the patentee uses floats, each attached to one arm of a set, and inclined at an angle. Bars connect the inner unattached edges of the corresponding arms. The wheel thus constructed may be used at the side of a vessel or submerged.

[Printed, 10*d*. Drawings.]

A.D. 1863, July 8.—Nº 1691.

MYERS, Edward, and **FORBES**, Hugh.—" An improved " method of propelling and steering ships."

"These improvements consist in a certain apparatus placed " below the water line, which apparatus is in connection with " two parallel tubes running from stem to stern in the interior of " the vessel, one being on each side of the keel thereof, and also " below the water line. The object of the apparatus is to draw " in water at the fore part of the tubes under the bows, whereby " an attractive power is gained at that end, while the water " so drawn in is rapidly driven out through the tubes, and is " expelled at the stern orifice, whereby a propelling power is " attained.

"The apparatus consists in a pair of tooth drums or wheels " working in a suitable case formed for the purpose, which teeth " of drums or wheels work into each other in a suitable manner, " so that the water passes around the exterior of said drums or " wheels, and thus is drawn from the stem orifice, and is forced " out of the stern orifice of the tubes which are connected with " the apparatus. The drums or wheels are caused to rotate by " steam or any other motive power. By reversing the action of " the apparatus the current of water becomes also reversed, and " the vessel is made to go stern forward. The steering of the " vessel can be performed by transverse tubes running from right " to left, connected with the two already described, which con- " nection can, however, be at option cut off. The action of these " transverse tubes for steering enables the current drawn in at " the orifice under the left bows to be driven out at an orifice " on the right flank near the stern, or that drawn in under the " right bows to be expelled at an orifice in the left flank near the " stern."

[Printed, 10d. Drawing.]

A.D. 1863, July 9.—N° 1709. (* *)

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Auguste Salzmann.*)—"Improvements in ships and in propelling "the same." This invention consists in "constructing the hull "of an elongated narrow form, and in connecting to the bottom "thereof a cylindro-conical tube; the communication between "the two is effected by three vertical cylinders. The tube is "divided into three water-tight compartments; the two end "compartments are left empty. The central compartment may "at pleasure be made to contain compressed air or water, whereby "the line of floatation may be regulated. To diminish the "friction of the three cylinders uniting the tubular keel and hull, "I enclose them in a casing. At the sides of the hull there are, "say, six supporting and propelling cylinders or drums divided "into water-tight compartments, which, together with the tubular "keel, maintain the ship at one level, and the drums keep it in "equilibrium. The circumference of the drums is not a plain "surface, but consists of two inclined planes meeting in the "centre, and sloping from the centre to each side. Floats are "attached by rods or bars to and parallel with the circumference "of the drums, but at a distance from it equal to about the "breadth of the floats; the object of the space between the "drums and the floats is to allow of the water running off instead "of being carried round by the floats, as would be the case if the "floats were attached directly to the drums. Each of the drums "is, by preference, driven by a separate engine, in order that all "or any of them may be worked as required."

[Printed, 8*d*. Drawing.]

A.D. 1863, July 20.—N° 1814.

GEDGE, WILLIAM EDWARD.—(*A communication from Charles Jacques Isaac Troll and François Jacques Mercier.*)—(*Provisional protection only.*)—"Improvements applicable to inland naviga- "tion."

A traction rope alongside a canal or river, is supported by suitable pulleys, and is caused to move by stationary power.

The boat may then be drawn by it when attached by a tow rope, which is furnished with a clamp movement so as to moderate the speed of the boat by detaching its tow rope more or less from the traction rope.

[Printed, 4*d*. No Drawings.]

A.D. 1863, August 5.—N° 1933.

HODSON, WILLIAM.—" Improvements in machinery used for " propelling carriages and vessels."

" This invention has for its object improvements in machinery " used for propelling carriages and vessels. For propelling a " carriage a combination of cranks and levers is employed. There " is fixed in the centre of the carriage frame an elevated cross " bar which stands on two brackets, one on each side of the " carriage frame. On the cross bar are fixed two or more swing " bars which hang perpendicularly, and are caused to work " backwards and forwards by the feet of a person or persons, " there being at the bottom of each swing bar a bearing for the " foot. The swing bars are about two feet six inches in length " and about 15 inches from the bearing of each bar is attached a " connecting rod linking it to a crank on the propelling wheels. " Hand levers are also connected to the swing bars, and all work " in one motion. The steering apparatus is worked from the " two front wheels and is acted on by the man's body, thus " allowing him to use both hands and feet in the propulsion, " when this is required, as in ascending hills.

" Boats and ships are propelled in the same way and on the " same principle."

[Printed, 6*d*. Drawings.]

A.D. 1863, August 7.—N° 1955.

WATSON, EDWARD.—(*Provisional protection only*.)—" An im-" proved apparatus whereby screw propellers may be made to " steer as well as propel, applicable also as an improved ball-and-" socket joint."

The inventor says:—

" The apparatus consists of a socket in which I form two or " more radial slots, and a ball upon which I fix two or four arms " according to the number of slots in the socket. I insert the " ball in the socket, and secure it by a cap through an aperture " in which that part of the shaft connected to the ball passes. " The socket is connected to the main screw shaft, and the ball " to a shorter shaft, which has a bearing in a frame free to move " on an axis passed through or into a metal bar projecting or " carried back from the keel, the upper part of the frame carries a " *toothed wheel* or other arrangement, whereby it may be turned.

" By turning the frame as a rudder, the screw will also be turned, " and consequently while propelling will steer the ship.

" In some cases I connect the screw blades directly to and " carry them through the case of the socket, and move them " therein, when the socket will act as the boss of the propeller."

[Printed, 4*d.* No Drawings.]

A.D. 1863, August 26.—N° 2114. (* *)

JOHNSON, John Henry.—(*A communication from Pierre Gardère and Charles Patek.*)—" According to this invention, it is " proposed to utilise the power derived from the rapid and con- " tinuous flow of water through pipes obtained artificially, by the " condensation of steam directed in the form of a jet or jets into " a vessel or chamber in connection with such pipes."

" In applying this system to the propulsion of ships, it is pro- " posed to employ one or more sets of pipes running longitudinally " along the vessel from stem to stern below the water line. An " opening is made near the bows of the vessel communicating " with the pipe in the fore part, and another opening is made " near the stern communicating with the pipe in the after part. " These two pipes open into a chamber, in which a jet of steam is " directed from a boiler in the direction of the pipe leading to " the stern, so that when the steam is turned on, a rush of water " takes place (by reason of the vaccum produced by the conden- " sation of the steam in the vessel) through the opening at the " bows along the pipe in the fore part of the ship and into the " steam vessel or chamber, whence it is expelled by the force of " the jet along the pipe in the after part of the ship, and issues " at the stern in the form of a powerful jet of water which has " the effect of propelling the ship along. In practice, it will be " advisable to have two sets of these pipes with their steam jets " directed in opposite directions, so that by bringing one or the " other set into operation, the vessel may be directed ahead or " astern as required."

[Printed, 8*d.* Drawing.]

A.D. 1863, September 3.—N° 2178.

JOLLIFFE, William, JOLLIFFE, Thomas, GRAHAM, William, and TAYLOR, Henry.—(*Provisional protection only.*)—" Improvements applicable to paddle and other propelling " wheels for navigable vessels."

"This invention has for its object an improved form and con-
" struction of paddle floats or wings, which are applicable to the
" common paddle or other propelling wheels of steam or other
" vessels. These improved floats or propelling wings in contour
" or profile much resemble the wing of a bee, or the flat longi-
" tudinal section of the body of a chemist's glass retort, and are
" constructed of flat iron, steel, or other suitable material, having
" a curvilinear longitudinal twist on the surface, and dip into the
" water and rise therefrom without the splash of an ordinary
" paddle, the twisted and narrow neck being so formed that the
" 'back water' passes thereby."

[Printed, 4*d.* No Drawings.]

A.D. 1863, September 5.—N° 2191.

MOODY, THOMAS, and MOODY, EDWARD TOMS.—(*Provisional protection only.*)—" Improvements in the generation and
" production of motive power to be applied generally, and in its
" special application to the propulsion of vessels."

Electro-magnets are caused to generate gases by the decomposition of water, and one portion of the gases is used to set the magnets in motion by lifting water to turn a Barker's mill. The other portion is admitted into chambers, where it is exploded a proper intervals, and in connection with long tubes fore and aft under water.

The action intended to be described seems to be that of water expelled through tubes by the explosive force of gases.

[Printed, 4*d.* No Drawings.]

A.D. 1863, September 9.—N° 2213.

TUCKER, WALTER HENRY.—" Improvements in the modes of
" propelling and steering vessels."

The first part of the invention deals with a method of steering by the propeller. At the rear of the stern-post is placed a vertical hollow cylinder with a pivot at its lower end, working in a bracket attached to the stern-post, and attached above by bands. Across the cylinder, and working in bearings in it, is placed a short horizontal cranked shaft which carries the propeller. Vertical crank rods from the shaft are connected to collar frames attached *to vertical rods* which work through the top of the cylinder.

These last rods are driven up and down by the engine and thus cause the propeller shaft to revolve.

The cylinder and apparatus attached to it is meanwhile capable of being moved to effect the steering of the ship.

Or, a similar cylinder may have "a projection or foot at its " lower end, through the length of which foot, and working in " bearings in it," is placed " a straight shaft having a pulley or " drum attached to it." The outer end of this shaft carries the propeller. "Across the foot transversely," "is a second or cross " shaft, also carrying a pulley, while a vertical shaft, receiving its " motion from the engines by gearing or otherwise, and carrying " a pulley near its lower end, passes through what may be called " the leg of the cylinder." A strap carries the motion from this pulley to the one on the propeller shaft.

The steering apparatus may be moved by a toothed wheel and an endless screw, or otherwise.

To transfer or diffuse the thrust of submerged propellers, "a subsidiary piece" is attached to " the end of the pivot or trunnion " which projects from the rear of the boss in some propellers," and the trunnion and its bearings are so shaped that the whole, or a portion of the thrust shall be taken by the bearings. Or, when the propellers have " shafts which are changeable in direction," the thrust is taken at a point between the propeller and the joint of the shaft.

To reverse the propeller without reversing the engine, the shafts are so arranged "that two portions" of the "mechanism shall " revolve in opposite directions to each other, to either of which " parts a belt or chain from the driving shaft of the engine can " be shifted as desired."

Or there may be two straps which convey motion to the propeller shaft in contrary directions, and either may be used as desired.

A new sort of rudder is also described.

[Printed, 10*d*. Drawing.]

A.D. 1863, September 17—N° 2281.

CHAPLIN, Alexander.—" Improvements in apparatus for " propelling ships or vessels."

The invention consists in applying a small paddle wheel temporarily placed *alongside* a vessel as an auxilary propeller.

The wheel is carried at one end of a rigid arm, the other end of which is pivotted so that the arm can be moved in a vertical plane parallel with the heel of the vessel. The wheel can thus be placed so as to secure the proper amount of immersion for the floats, and then be secured there, or the wheel may be a floating drum to rise and fall with the water.

The wheel is turned by an endless band or chain round its axis, and round a moving shaft concentric with the pivot, so that in all positions of the arm and wheel the band or chain is equally tight.

[Printed, 8*d*. Drawings.]

A.D. 1863, September 17.—N° 2288.

CHADBURN, CHARLES HENRY, and TRISTRAM, WILLIAM JOHN.—(*Provisional protection only.*)—" Improvements in the " construction of ships and other vessels, and in the machinery " for propelling them."

A ship is formed in two parts, hinged together, " so that the " motion of the waves will produce a movement between the " parts." This movement is caused to work pumps which communicate power to reciprocating engines, to drive the propeller; or the pumps may eject water for purposes of propulsion; or the motion may be communicated direct to cranks which drive the propeller. An auxiliary steam engine is used for navigation in smooth water.

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 18.—N° 2301.

NEWTON, ALFRED VINCENT.—(*A communication from Jean Pierre Servè, junior.*)—(*Provisional protection only.*)—" An im- " provement in propelling vessels, and in apparatus relating " thereto."

Water supplied by " hydraulic motors " passes through a hollow screw propeller shaft, and then out through hollow vanes of the propeller. The object appears to be the utilization of the centrifugal force of revolving propellers, but the mode of doing this is not clearly described. The Provisional Specification concludes as follows :—" The peculiar feature of the invention consists in " the employment of any hydraulic motors in vessels propelled " *by screws* (whatever may be their dimensions) which supply

" water, which it is proposed afterwards to expel economically by
" the centrifugal force developed at the extremity of the blades
" of the hollow propeller; the pressure of the water surrounding
" the vessel being much less behind than at all other parts, facilitates to that extent the exit by the screw of the water introduced
" into the vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 26.—N° 2375.

WILSON, Edward Brown. — (*Provisional protection only.*) — " Improvements in furnaces and fire-places applicable to the " heating of steam boilers and other purposes."

The invention is described as applied to a locomotive, but it is stated that the same arrangement is applicable to marine engines.

A transverse midfeather descends near the bottom of the firebox, " which consists of a closed water space in lieu of fire-bars." The front part of the fire-box forms the receptacle for the fuel. The part behind the midfeather forms a combustion chamber. The fire-box may be extended or not into the barrel of the boiler. Air is supplied by a pipe with a trumpet-shaped mouth. The pipe may be brought through the smoke box, so that the air may be heated. A supply of air may also be introduced "by means " of tubular stays or otherwise." The air may be introduced at different levels; valves regulate its admission.

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 28.—N° 2377. (* *)

JEAN, Louis Joseph Joachin.—This invention relates to the fire-grates and tubes of steam boilers. It is described as applied to a vertical boiler. The body of the boiler is filled with vertical tubes disposed in concentric circles; the upper ends being bent outwards, are set into the upper part of the sides of the boiler, and the lower ends of these tubes are set into a horizontal tube plate which constitutes the top of the furnace. The sides of the boiler are inclosed by a metal casing, which forms a surrounding flue, whereinto the products of combustion pass from the bent ends of the tubes, and take a downward course to the chimney flue.

The fire-bars are ranged on a circular frame, mounted on a horizontal carriage, which by means of worm gearing round the frame, is caused to revolve, being actuated by a worm on a shaft, whereon is a small differential speeded strap pulley. A hopper supplies fuel to the furnace in regulated quantities, and a revolving projector, furnished with radiating arms or wings, distributes it over the burning fuel. The hopper and feeding apparatus are disposed on a carriage, which is mounted on rails in front, so that it can be withdrawn whenever necessary. Air is admitted to the under side of the fire-bars through suitable openings.

Modifications of the invention, as adapted to a locomotive, a double furnace marine boiler, and a stationary boiler, are shown and described.

[Printed, 8*d*. Drawing.]

A.D. 1863, October 5.—N° 2431.

STANLEY, JOHN MARTIN, and STANLEY, JABEZ.—"Im-" provements in propelling."

Water admitted from below a vessel at the bow or stern or sides, as may be desired, is expelled by a steam engine through tubes, so as to propel the vessel and to govern its direction.

The emission of the water is governed by four stop valves, so geared together that when the forward pair are open the after pair are closed, and vice versa.

The motion of the slide valve of the steam engine is given and repeated by an improved valve lever in connection with a governor, ball, throttle valve, and other apparatus.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1863, October 7.—N° 2457.

RIGG, ARTHUR, junior.—(*Provisional protection only.*)—"Im-" provements in apparatus for propelling vessels."

The backwater of paddle wheels, and the water thrown upwards by the rotation of screw propellers vanes, is caused to move in a sternwards direction by placing curved plates, which will gradually change its direction of motions.

The screw propeller may be surrounded by a cylinder, and a grating may be placed forward to prevent weeds from entering.

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 8.—N° 2462.

JOHNSON, JOHN HENRY.—(*A communication from Eugène Mouline.*)—(*Provisional protection only.*)—"Improvements in pro-" *pelling ships*, and in the apparatus employed therein."

The vessel is propelled by the fore and aft action of plungers or cylindrical pistons acting in the water. These, at the same time, exhaust the gaseous products of the furnace, and expel them forward under water, "so as to reduce the friction of the vessel in " the water by interposing a film or films of air or gaseous vapour " between the sides of the vessel and the surrounding fluid." The plungers have velocity in their outward stroke twice that of their inward stroke.

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 17.—N° 2543.

MEIRAT, Yenn.—(*Provisional protection only.*) — " Improve- " ments in the means of propelling vessels."

The paddles or screw propellers of a vessel are worked by a turbine, which is turned by water received from near the water line, and allowed to leave the vessel at the bottom.

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 23.—N° 2620.

PARKER, James.—" Improvements in the application of steam " combined with air as a motive power, and for other purposes."

Air is drawn by a steam jet so as to pass along with the steam and to be expanded and heated thereby. The manner of applying the combined steam and air will be understood from the description as follows :—

" I use steam, in preference, superheated high-pressure steam, " in one or more jets, to draw or drive atmospheric air into or " through one or more air pipe nozzles or openings into one or " more pipes communicating with a receiver from whence the " steam and air is to pass to a steam cylinder or cylinders, like " steam in an ordinary steam engine, or the air pipe or pipes " may communicate directly with the cylinder. The air in its " passage to the cylinder or receiver becomes heated by the steam, " whereby an increase of motive power is obtained, and the mixed " steam and air is less liable to condensation than steam only. " The combined steam and air instead of steam only may be " used in an ordinary noncondensing steam engine, but to obtain " the same power a cylinder of a larger sectional area must be " employed. The steam and air after it has been used as a " motive power is further economically employed as a warm blast

" to the furnace, where it will produce a more perfect combus-" tion and prevent loss by smoke, or by passing the steam " and air first through gas tar, parafin, petroleum, or liquids of a " like nature, it will absorb a certain amount of the same, and " may then be passed to the furnace to be applied for heating " the boiler. I intend to apply engines worked with steam and " air as above described, in place of the ordinary steam engine, " as stationary and portable engines, as locomotives, and for " propelling vessels, and also for propelling carriages on the " common road."

" The receiver and cylinder above-named are heated by the waste heat of the furnace."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 27.—N° 2649.

HOLDERNESS, THOMAS HUNTER.—(*Provisional protection only*.)—" Improvements in propelling navigable vessels."

" This invention has for its object an improved means for pro-" pelling navigable vessels by means of atmospheric air ejected " through suitable pipes or passages formed in the stern or after " part of the vessel, and opening out below the water line, and " consists in forcing a current or blast of air through and from " the said pipes or passages by means of the improved or ordinary " blast fans worked by a steam engine or other motive power. " When only a single blast fan is used, the current of air is " conveyed therefrom through a breeches pipe, as will be readily " understood.

" It is preferred to place the blast fan in such a position in the " vessel that the discharge pipes may be carried in as near an " horizontal position as possible. This mode of propelling is " intended mainly to be used as an auxiliary propeller in light " winds and calms by vessels which have a small engine on board " for loading and discharging cargo and working the ship's " tackle, which engine in that case is used to drive the fan blast. " When found desirable, the ejection air passages may be fitted " with slides or cut off valves, or valves opening outwards, which " will close by their own action when not acted upon from the " inner surface by the air blast."

[*Printed, 4d.* No Drawings.]

A.D. 1863, October 28.—N° 2673.

KENNEDY, John. — "Improvements in the construction of "ships of war and other vessels, and in masting and rigging the "same."

A "double" man-of-war is described, fitted with propellers, "upon the double after-ends," preferably of the construction described in No. 1527, A.D. 1862. The object of this is to move the ship's head so that each broadside can be delivered alternately.

[Printed, 3*s*. Drawings.]

A.D. 1863, November 5.—N° 2749.

SICKELS, Frederick Ebsworth. — "An improved mode of "and apparatus for steering and turning vessels."

Nearly the whole of the Specification is taken up with descriptions of novel forms for rudders and new methods of working them. The only parts connected with the present series are as follows :—

When the rudders are being operated by power a supplementary engine is used "for reversing the action of the propelling engines "on the propellers" so that "the currents created both by the "forward and backing motions of the propelling engines" are brought "upon one and the same side of the rudder." The vessel, the inventor says, may thus be caused to revolve without moving ahead or astern. The supplementary engine may be used to work the rudder.

"In connection with the propelling engines is an indicator" near the steersman, "its object being to indicate to the steersman "the position into which the rudder is to be shifted according as "the direction of the indicator of the propeller is shifted to turn "the vessel."

"A solid ship's rudder" may be converted "into a reciprocating propeller for turning the vessel" by giving it an alternate motion.

The propeller blades may be made of vulcanite, strengthened by iron bands.

When the propelling engine is used to work the rudder, a friction connection is employed to prevent undue strain being thrown on the rudder.

[Printed, 6*s*. 4*d*. Drawings.]

A.D. 1863, November 9.—N° 2780.

COCHRANE, Arthur Auckland Leopold Pedro.—"Improvements in propelling and steering ships."

Steam forced through an orifice is caused to draw with it air from an annular space round the jet, and this combined air and steam jet also draws additional air from an annular concentric space, until at last the force of the steam is represented by a large mass of air moving at a low velocity. Water may be allowed to enter instead of air (as stated in the Provisional Specification), or water may be conveyed into the moving column of air by a central jet, which causes the water to disperse and occupy all parts of the cylindrical space.

The air, or air and water, may be used for propelling a vessel by discharging the fluid at the stern.

[Printed, 6*d*. Drawing.]

A.D. 1863, November 12.—N° 2820.

FORD, David. — "Improvements in propelling boats and "barges."

The invention "has reference to the construction and employment of apparatus for propelling boats and barges upon rivers "and canals, whereby the same is contained and worked in less "space more conveniently and expeditiously than by the present "system, and consists in employing for the said purpose short "buoyant propelling vessels to be connected or disconnected "to or from barges, boats, and other vessels at pleasure, fitted "with screws, engines, and steering apparatus, which said "apparatus admits of being folded close to the stern of the said "short propelling vessel when required, so as to occupy less "room in the locks or cisterns when passing through the same, "by which said arrangements the propelling vessel may be "caused to pass through the locks in connection with the boats "or barges with one still or cistern of water, whereby considerable saving of time in the passage of the said boats or "barges through the locks, as also in the waste or loss of water "and cost of working the same, is effected."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 16.—N° 2868.

***GRIFFITHS,* Robert.**—(*Provisional protection only.*)—"*Improvements* in propelling ships or other vessels."

When the screw propeller to be applied to a vessel of light draft, broad floor, and bluff ends, the patentee mounts it "by "suitable means attached to the stern post or under the counter "at an angle of about 45° (or other suitable angle of inclination) "to the upright stern post, the end of the screw placed at such "angle looking downwards and towards the bow of the vessel."

By this means the water is drawn more from beneath the vessel.

Two of these inclined screws may be used, one at each side, or the usual screw may be used in addition to these.

[Printed, 4*d.* No Drawings.]

A.D. 1863, November 18.—N° 2895.

GRÆME, Patrick St. George.—(*Provisional protection only.*)—"Improvements in ships or vessels for war and other "purposes."

The invention consists in constructing the hull of a ship "of "an elliptic or other similar flat transverse sectional form." The only part relating to the present series is the following :—

"The vessel is propelled, by preference, by means of a rotary "pump or pumps or similar apparatus for propelling water" placed in a sunken chamber below the water-line which contains the engine room "which pump or pumps propels or propel the "vessel in one direction or another by drawing water through "one or more passages and discharging the same through one or "more other passages, and these passages, the apertures of which "are in the sides of the projecting part of the sunken chamber, "are so arranged and connected to the pump or pumps by means "of valves, that the water may be drawn in through a passage on "the larboard side, and discharged through an opposite passage "on the starboard side, or vice versa, thereby effecting either the "turning of the vessel in whatever direction may be required, or "a side motion of the same."

[Printed, 4*d.* No Drawings.]

A.D. 1863, November 19.—N° 2898. (* *)

ELDER, John.—This invention relates more particularly to inverted cylinder steam engines, suitable for driving screw propellers, the principal object being to arrange a compact, convenient, and accessible disposition of the various parts. Three modifications are shown and described. The first consists of two cylinders of different sizes disposed on the vertical plane of the shaft, the smallest cylinder receiving the steam at high pressure direct from the boiler, and the larger cylinder receiving the same steam after it has operated the piston in the high-pressure cylinder, to which the steam is admitted by valves in a casing at the cylinder side, including a cut-off expansion valve. The transference of the steam to the large cylinder and thence to the condenser is effected by valves interposed between the two cylinders. The condensers are formed one in each side of the framing which supports the cylinders, and are fitted with horizontal tubes disposed parallel to the shaft; the framing is in one casting, formed below the condensers with arches or openings both parallel with, and at right angles to, the shaft; it is bolted down at the four corners to the sole plate. The water of condensation drains off, by passages formed in the frame casting, to the air pump, which is disposed outside, together with the cold water and other pumps, under a rocking shaft which works them by levers, that which works the air pump being linked to the slide block of the piston rod of the low-pressure cylinder; " Randolph and Elder's valve " gearing " being used for actuating the valves; a secondary or valve shaft, driven simultaneously with the main shaft, carries the valve excentrics, which are reversed by the longitudinal movement of the shaft. The steam cylinders and covers are steam jacketted. In the second modification, the low-pressure cylinders are each connected with two high-pressure cylinders, one disposed above and the other below, the three pistons being upon one rod; the high-pressure cylinders are heated internally by having steam constantly on the non-acting side of the pistons, and all three are constructed to receive steam internally by communicating with each other through the piston rod, which is made hollow for the purpose.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1863, December 8.—N° 3100.

WINANS, William Louis, and WINANS, Thomas.—" Im" provements in adapting screw propellers for propelling ships " *or vessels* for ocean navigation."

By the invention screw propellers are applied to vessels of a spindle shape, the end being like a cigar, and the shaft supported on brackets. There may be one or more such propellers, and if two are at one end, the rudder works between their shafts. If one propeller is placed near the stern, the rudder (which is then to be forward of the propeller) may be formed of two leaves, one on each side of the shaft. If there be a propeller at each end of the vessel, both may be on the same shaft.

The patentees also claim "the adaptation of any of these "arrangements of screw propellers to spindle-shaped vessels with "flat or nearly flat upper decks."

[Printed, 10*d.* Drawing.]

A.D. 1863, December 11.—N° 3121.

LIVINGSTONE, William.—"An improved feathering screw "propeller with fixed blades."

The screw propeller blades and boss are in one piece (if two opposite blades are used), and by turning this on the axis of the blades, their surfaces will be placed more or less inclined to the line of the keel.

The mode of turning the blades is minutely described. The boss is of a ball shape, and has grooves or recesses into which keys take, so as to secure the blades at a desired angle, and to brace up a band which grips the moveable part as the band of an eccentric does, so that the motion of the shaft carries the boss and blades round. When the grip is relaxed, the blades may be turned by a spanner from the deck. This arrangement may be applied to more than two blades, but the mode of doing this is not particularly described.

[Printed, 8*d.* Drawing.]

A.D. 1863, December 15.—N° 3165.

BOX, William Williams.—"Improvements in fire-bars for "the boilers of locomotive and other engines, and for fire-boxes "and furnaces generally."

This is an improvement upon an invention N° 1491, A.D. 1863. Fire-bars are made of an oval shape with "the small part "downwards." They are hollow, and the ends cylindrical. Screw threads on the ends screw into junctions, also hollow. Any number of bars are thus joined to form a grate. Water is admitted at one corner of the furnace to the interior of the first bar, and flows backwards and forwards through each bar, till it comes out at the opposite corner.

The bars may be mounted on "a skeleton cross frame, hinged "at one end," and raised and lowered by a lever and balance weight. The hinge on which the bars move is hollow and water-tight. This "tipping frame enables the fire to be instantly shot "out of the grate in case of need."

The improvements may be applied to marine boilers.

[Printed, 10*d*. Drawing.]

A.D. 1863, December 19.—N° 3212. (* *)

HOWDEN, James.—This invention relates to steam engines and boilers, and to apparatus connected with working them. It consists of several arrangements and modifications in the general construction of engines and boilers, chiefly for marine, as also for other purposes. The first part described consists in placing two pairs of "double expansive engines" with inverted high and low pressure cylinders, in such parallel position that their respective crank shafts lie in parallel lines on the same horizontal plane. The steam is worked from the high to the low pressure cylinder, after the manner described in the Specification of Letters Patent granted to this inventor bearing date 4th January 1862, No. 34. When two pairs of these engines are employed to drive a single screw, a spur wheel on each crank shaft gears a pinion on the propeller shaft, but when applied to drive twin screws, they are driven separately direct from the crank shaft of each engine, in which case it is not absolutely necessary that they be disposed with regard to each other in parallel lines. The condenser is placed between the engines, partly supporting the cylinders of each pair, the remaining supports being standard frames rising from the sole plate, the guide frames for the piston rods being interposed between the condenser and the outer frame standards. Surface condensing is preferred, the tubes in the condensers being horizontally disposed; a common injection apparatus may be employed. The whole of the pumps are placed in front of the engines on the lower part of the framing, and are actuated by a pin in an auxiliary crank or disc on each crank shaft; each pin works in a sliding block, which block works between the bars of a slide frame, whereon, on one side, are attached the rams for working the feed and bilge pumps, and to the other side the rods of the air and circulating pumps, which with their valve boxes are disposed at the central part of the framing, and the feed and bilge pumps at the outer ends.

The other improvements and modifications in engines consist in simplifying the construction of the starting gear. Each pair of engines are placed at such an angle with the horizon that their connecting rods may be attached to the same crank shaft. The before described arrangement of pumps is worked in connection with other marine engines, and the cylinders of grass-hopper lever engines are inverted, and their piston rods placed in direct communication with single central working beams. The invention also extends to the use of filtering beds in the hot well, to purify the water for feeding purposes, and to various improvements in cut-off valves, supplementary to the before-named invention; it concludes with a supplementary improvement to a tubular boiler (also described in the said previous invention) which consists in placing a separate series of tubes directly over the fire. Access to the fire is obtained by doors separate from those by which access is obtained to the upper series, both series being contained in the same water chambers.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1863, December 21.—N° 3219. (* *)

PATERSON, Robert.—The object of this invention is to obtain in steam engines an improved vacuum, at the same time that the surface or size of the condenser employed is reduced, and less than the ordinary quantity of injection water required, while the feed water is supplied to the boiler at a comparatively high temperature. A condenser combining surface and injection condensing as applied to a marine engine, is described. An enlargement is formed on the top of the condenser to receive the constructive parts, and they are arranged in such a way as not to impede the inward flow of the steam, which enters by a passage opening into one side of the top. The cold water enters by a pipe in the centre of the crown, and is received in a perforated dish, whence it falls in a shower upon the entering steam; the water thus heated, together with the condensed steam, falls into a shallow vessel disposed across the condenser, while the uncondensed steam passes over the external surface of the vessel and among the *condensing* tubes, which are horizontally disposed in the body of the condenser below; a series of wood floats swims upon and cover up the surface of the water in the vessel, and so prevent evaporation. The quantity of water admitted is regulated by a valve, which is acted upon by a diaphragm, which sustains the pressure of the atmosphere on a limited space outside, while the water from the hot well acts against its inner side, and tends to open the valve; this action is limited by a screw stop, whereby the valve may when necessary be entirely closed. An air vessel is applied near the feed pump to the pipe leading from the collector, in order to ensure the perfect action of the pump. A vertical section of a marine engine is also exhibited and described, with a modified arrangement of the parts of the condenser, formed in the hollow framework supporting the cylinder, which is of the inverted class.

[Printed, 1*s*. 2*d*. Drawings.]

1864.

A.D. 1864, January 12.—N° 87.

WHEATLEY, John.—"Improvements in apparatus for pro-" pelling vessels."

A screw propeller is worked by a windmill on deck astern, with or without a steam engine. Arrangements are described for turning the windmill so as to face the wind as may be required.

" The axis that carries the sails of the windmill turns in suit-" able bearings carried by a small table or bed, that is supported " at a suitable distance above the upper deck by legs or supports, " that at their bottom are carried by a double circular ring that " is so supported by the deck that it can be turned on its centre, " and the axis of the windmill so turned in any desired direction. " The ring is for this purpose provided with cog teeth, and is " supported by rollers or balls, so that it can be turned in like " manner to a turntable. The windmill axis has upon it a break " and a crank, which by a connecting rod gives motion to a shaft, " that by toothed wheels or otherwise gives motion to the screw " or paddle shaft; the connecting rod is provided with a swivel " joint intermediate of its length in order to allow of the axis of " the windmill being turned in any desired direction."

[Printed, 1s. 10d. Drawings.]

A.D. 1864, January 12.—Nº 89.

WELCH, William.—" Improvements in mechanical apparatus " for propelling, navigating, and governing ships and other " projectile bodies, applicable also to ventilation."

The specification describes several modes by which certain curved figures can be traced, that may be used for surfaces of propellers.

The "mechanical apparatus" alluded to in the title is mentioned without particular description, but it is illustrated by more than fifty drawings, and appears to include propeller blades of various shapes adjustable on their axes, and rudders acted on by chains. Reference is made to No. 2584, A.D. 1861.

[Printed, 1s. Drawings.]

A.D. 1864, January 18.—Nº 137.

GRÆME, Patrick St. George.—" Improvements in apparatus " for propelling ships or vessels, and applicable to the raising and " propelling of water and other fluids."

Improvements upon Nº 1691, A.D. 1863. On the axis of the drums described in the former specification, cog wheels are placed, with teeth precisely similar to those on the drum. These wheels may be at one or both ends of the axis. By this means the pressure is taken from the drums, and they are rendered less liable to wear out.

To relieve the drums still further from friction, thin cogs are made "in the least possible extent smaller" than those of the outside gearing, and they may be coated with india-rubber. The cogs are all made of such curves as to avoid friction as much as possible. Sometimes the length and pitch of the cogs on the drum are greater than that of those of the gearing.

[Printed, 1s. Drawing.]

A.D. 1864, January 22.—Nº 181.

JOHNSON, John Henry. — (*A communication from John Harris.*)—" Improvements in propelling and steering ships and " vessels."

The mode of propulsion employed is the reciprocating action of a float or vane, which is caused to dip and act on the water, and *to feather and withdraw* for the return stroke by one of several plans. In these the requisite vertical and horizontal motions are given by cranks and levers and studs working in grooves.

For steering purposes the action of the propeller is applied at right angles to the direction of the keel. A crank is described as built up of T-iron or angle iron, secured together in the form of a circle, in a circular form.

[Printed, 1*s*. Drawing.]

A.D. 1864, January 2.—N° 189.

MARKLAND, THOMAS, WILLIAMS, THOMAS, and SHERIDAN, JOHN BRINSLEY. — (*Provisional protection only.*) — "Improvements in paddle-wheels for propelling steam or other "vessels."

The paddle-floats are feathered or turned upon their radial axes, by the action of a "scroll tappet" which it would seem acts as a cam upon the arm supporting each float, and causes it to present its broad surface when it strikes the water, but to turn a sharp edge when in progress for immersion.

[Printed, 4*d*. No Drawings.]

A.D. 1864, January 23.—N° 193.

MYERS, EDWARD, and GLOAG, HENRY DUNDAS.—(*Provisional protection only.*) — "Improvements in apparatus for "propelling and steering ships or vessels."

The vessel is propelled by water ejected through tubes, which are closed or opened by suitable valves so as to direct as well as to propel the vessel.

The water is set in motion by two toothed or fluted rollers or drums revolving in gear. The grooves or flutings are inclined at an angle to the axis of each drum, and the teeth and hollows between them are made (by preference) half round, the teeth convex, and the hollows concave.

[Printed, 10*d*. Drawing.]

A.D. 1864, February 6.—N° 318.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from William Robinson Manley.*) — "A new and useful improvement "*in feathering* paddle-wheels."

This is a modification of the usual plan of feathering paddles, arranged on Buchanan's method. By connecting the feathering crank of each float to all the others by means of rods in a framework, the strain caused by the water acting on the floats submerged is distributed throughout the frame, and is thus more conveniently sustained.

[Printed, 10*d*. Drawing.]

A.D. 1864, March 1.—N° 514.

HUMPHRYS, Edward. — "Improvements in machinery for "propelling vessels when twin screw propellers are employed."

On the shaft of each screw propeller there are two friction discs or bevelled wheels with angular grooves. The main shaft across the vessel also carries a similar disc or grooved wheel at each end, and these are so placed that by moving one or other of the propeller shafts forward or back one or other of the discs on them will be brought in contact with one or other edge of the corresponding disc on the main shaft. When this takes place, the rotary motion of the propeller tends in each case to tighten the contact between the discs. The thrust bearings are at the ends of the main shaft. By this means, while the main shaft turns always in one direction by the action of one steam engine, the propellers may be readily caused to rotate in either direction, or to stop, by moving the propeller shaft of each by a lever in the proper direction.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1864, March 1.—N° 516.

WILD, John. — "Improvements in propelling vessels, and in "machinery or apparatus connected therewith."

Water taken from the fore part of a vessel is forced out at the stern by a screw, or pump, or turbine, or other mode so as to propel the vessel.

The drawing represents a screw revolving in the interior of the vessel under water or partly submerged.

[Printed, 10*d*. Drawing.]

A.D. 1864, March 2.—N° 526.

BARLAND, Margaret, and O'KEEFE, Thomas.— (*A communication from Thomas Barland.*)—(Provisional protection only.)

—"Improvements in obtaining motive power, and in applying " the same to the propulsion of ships or vessels and to other " useful purposes."

Revolving windmill sails protected by screens on one side, are placed on the deck of a vessel and propel it by moving machinery in the water. The hull of the vessel consists of several tubular parts with spaces between them.

[Printed, 4d. No Drawings.]

A.D. 1864, March 4.—N° 550.

HENRY, Michael.—(*A communication from Louis Coignard.*) —"This invention relates to apparatus for propelling, in which " propulsion is effected by the reaction of streams of fluid projected " against the side of ejection pipes or propeller tubes before " escaping therefrom." It also relates to pumps "and mainly " to those on the aquamotor principle" (N° 316, A.D. 1862, and N° 1324, A.D. 1863). Four ejection pipes are used "proceeding " from opposite points of the channel reservoir or force vessel into " which the water is driven from the drum of the aquamotor " pump." Two pipes pass to an outlet on each side of the vessel. The outlets have valves, so that by closing one the vessel may be steered. An "improved pump, on the aquamotor principle" is described. It is called a "simplex aquamotor." Instead of there being a reservoir, "the water is made to deviate freely on " issuing from the drum, but is collected continuously at the " annular outlet." "A semi-spherical or semi-elliptical aquamotor " drum" revolves on an axis in a fixed casing. It has a suction opening at one end. "There is only one suction end to this " pump, this part of the pump being formed like one half of the " aquamotor pump." At the opposite end the drum is nearly closed by a plate, between which and the edge of the drum an annular opening is left, and through this the water is discharged into "an annular opening" "comparatively narrower than the " passage of the pump," and having its sides so formed as "to " reflect the streams and force them to converge to the force " passage or delivery end of the pump towards the axis." This pump "may be used for propelling boats, rafts, or barges on " canels, &c., by large quantities of water being raised by it to a " small height and dropped on inclined planes."

"Winding helical vanes" which have a spiral form, may be used for the pump.

"The suction and force pipes may sometimes be formed or "partially formed of metal rings surrounded by a flexible tube "protected by a caoutchouc pipe round which cords twine or "fillets are wound; at their ends are junction pieces fastened by "jointed bolts, taking into lugs on a collar which turns on the "junction piece. Improved bearings for the shafting may be "formed in three pieces with wedge-shaped feathers sliding in "grooves fitted in boxes formed with three recesses corresponding "to the slots between the wedges; into these recesses the grease "flows through a space communicating with them. A packing "may be formed of lead washers ground true, or of flexible "washers, such washers being held in place by metal discs con-"nected by stays so as to form a frame or cradle round the shaft "or journal, to facilitate its being cooled and lubricated. It may "be further packed by a flexible washer, pressed up at the edges "to form a lip. Pipes may lead into the stuffing box from the "annular passage, force vessel, or delivery end or part of the "pump, whereby" "the shaft is kept cool, and a hydraulic joint "obtained."

[Printed, 1s. Drawings.]

A.D. 1864, March 5.—N° 554.

LOCKWOOD, John, and WETHERILL, James.—(*Provisional protection only.*)—"Improvements in propelling steam ships and "sailing vessels."

"It consists in forcing air through tubes or cylinders by "means of air pumps or other machinery through port holes or "outlets in the bottom of ships and vessels below the surface of "the water, so as to cause the pressure and force of air to act "against that of the water, and thereby to propel the vessel "forwards or backwards as may be required.

"The ordinary machinery in use for propelling steam vessels "by means of screws and paddles can be adapted to this inven-"tion and made to work the necessary pumps. In case of there "being two port holes or outlets, one on the starboard and the "other on the larboard sides of the vessel, each stroke of the "piston can be made to open one and close another valve, "through which the air will be alternately received and forced. "The object is to dispense with paddles, screws, and such like "machinery in propelling vessels."

[Printed, 4d. No Drawings.]

A.D. 1864, March 18.—N° 696. (* *)

BURRELL, JAMES.—This invention relates to a self-acting scum or brine and feed cock for marine steam boilers; it may also be used as a salinometer and water gauge. A vessel is employed divided by a vertical partition into two compartments or chambers of unequal size, and closed at the top by a lid; both chambers are, by suitably bent pipes, connected to the boiler below the water level. The largest chamber is in communication with the boiler, whence the brine or salt water, by means of a second pipe near the water level, is kept in circulation; the smaller chamber contains distilled water which, by reason of its specific gravity being lighter, does not mix with the brine. In each chamber there is a hollow tubular float, weighted to sink below the surface. By upright rods fixed to the top of these floats, they are jointed to the opposite ends of a horizontal lever, the fulcrum of which is a stud, which has liberty to move up and down in a fixed slot, in accordance with the rise and fall of the water. The lever is furnished with a third or pendant arm in the form of a T, which, as the inclination of the lever is changed by the relative position of the two floats according as the specific gravity of the brine increases and diminishes, is made to operate the scum cock by means of an adjustable connection. A pipe leading from the boiler to a tank or vessel, superposed above the distilled water chamber, acts as a condenser and keeps the chamber supplied with water. A second float, of the ordinary kind, is disposed in the brine chamber in connection with the feed cock, and regulates the supply to the boiler. Glass plates are fixed in front of the vessel opposite the rod of each float, through which the height and relative levels of the water in the chambers can be observed.

[Printed, 10*d*. Drawing.]

A.D. 1864, March 24.—N° 743. (* *)

WRIGHT, ROBERT HOLMES.—(*Provisional protection only.*)—This invention relates to marine surface condensers, and "consists "in forming a refrigerator in the bottom of the vessel under the "engine-room floor or any other part of the ship which is made "perfectly water-tight, and forms an inner skin or double bottom, "in which space the condensers are fixed, entirely surrounded by "a continuous supply of water taken in at the sides or fore body "of the vessel, and discharged in the run, or most suitable place

" after having performed its refrigerating operation; the inlets and " outlets are regulated by valves, which can be shut off when not " required, and the ordinary condenser used, by reversing a valve " in the eduction passage for that purpose, the condensers being " continuously surrounded by water, and supplied at the rate of " the vessel's progress through the water, which must always " remain at nearly the same temperature; this object being " obtained without the aid of air or any other pumps must relieve " the engines of all that power required for working this at present " indispensable adjunct, and effect a great economy in fuel, the " only pumps required in connection with the engines are the " usual feed pumps for supplying the boilers, also a small pipe to " make good any waste of water that may ensue."

[Printed, 4d. No Drawings.]

A.D. 1864, March 26.—N° 763. (* *)

SYMES, James.—This invention of locomotive apparatus is described as follows:—" I construct a spherical vessel or globe " of iron of any required dimensions, say fifty feet in diameter. " This hollow globe is to be furnished with an axle passing " directly through its centre, to which axle a boat or other " receptacle is slung; this receptacle is also built of iron, and if it " be formed of a spherical shape, its upper half may be of zinc " or other light material sufficient for a covering to protect the " inmates from draught and cold. A steam engine" and boiler " of about thirty horse-power is to be fixed in the suspended " receptacle or chamber so as to propel the axle in the globe, " causing the globe to revolve around the chamber, which remains " level and dependant from the axle; an opening is made on " each side of the globe for ingress and egress, and for ventilation " and the escape of steam or smoke. The interior "is fitted " either for carrying mails or cargo," fuel, crew, and passengers. " The axle or shaft extends beyond the periphery of the spherical " vessel, and serves to sustain a chamber for the steersman, who " operates with a rudder suspended therefrom. On sea the " vessel would draw about 10 feet of water, and would roll or " revolve over the surface with great rapidity. The vessel would " also be applicable for discovering the sources of large rivers " or for exploring and traversing sandy deserts. In the latter " case the *propelling* action would be the same as for water

" passage, the apparatus revolving along the surface of the " ground, but the steering would be accomplished by means of " guide wheels let down as trails in place of a rudder, which " would be removed and secured in the interior of the apparatus." " For land purposes, trailing wheels could be attached to the " axle, and turned to any desired angle by chain or other " gearing so as to guide the locomotive apparatus in any desired " course."

[Printed, 8*d*. Drawing.]

A.D. 1864, April 4.—Nº 840.

NEWTON, WILLIAM EDWARD.—(*A communication from John Merlett.*)—(*Provisional protection only.*)—" Improvements in the " construction of paddle wheels."

The invention relates to paddle floats which feather by turning on their radial axes. It " consists in constructing such a paddle " wheel with a hollow hub or nave of suitable diameter and depth, " furnishing the float spindles within the hub with a system of " wipers, and also arranging within the hub a stationary cam or " system of stationary cams, in contact with which the wipers " are caused to work by the rotation of the wheel, so as to " produce the turning movements of the spindles and floats at " the proper stages of their rotation about the axis of the wheel, " and to prevent them from turning during the remainder of " such rotation."

It " also consists in the construction of the entire frame of " such paddle wheel in the form of a box, which is divided " in a plane perpendicular to its axis into two equal parts, " whereby facility is afforded for the insertion and the securing of the bucket spindles, wipers, and cams, and for their " removal and repair. It further consists in securing the " stationary cam or cams in place within the hollow hub of the " wheel by means of a stationary socket attached to the vessel " surrounding the shaft of the wheel and fitting to a stuffing " box in the hollow hub."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 6.—Nº 860.

FULLER, GEORGE HENRY.—(*Provisional protection only.*)—" Improved mechanism applicable to the general purposes of " *propulsion*."

The invention has reference, as far as regards this series, to the propulsion of boats and carriages upon common roads. It consists in forming the connecting rods which give motion to the shafts of the engine "in two parts jointed centrally together so as " to work with the outer ends thereof fixed or secured to the " framing of the machinery or otherwise, whilst the opposite end " is caused to communicate motion direct to the crank pin " through the medium of a rod connected to the central joint " worked by steam, hand, or otherwise, by the vertical action of " which the jointed connecting is alternately brought from an " acute angle to a parallel line, thus forcing the cranks alternately " round, the said cranks being set at right angles upon the shaft " and worked by a single throw or movement upon the same."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 7.—N° 871.

ADAMS, William Bridges.—(*Provisional protection only.*)— " Improvements in the construction and propulsion of vessels."

The first part of the invention relates to armour-plating ships. For the propulsion of vessels the inventor uses "liquid fuel, such " as oil or melted grease" of any sort, but prefers coal oil, petroleum, or shale oil. It is to be stored in tanks with air passages through which air may be injected. From the bottom of the tanks pipes lead to the furnace. The ends of these pipes are pierced with small holes. Concentric and around them are other pipes, through which air is injected by pressure. The mixed air and spray of oil is delivered into the furnace. Stop-cocks regulate the supply.

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 7.—N° 874.

RIGG, Arthur, junior. — "Improvements in apparatus for " propelling vessels."

Curved blades are placed so as to deflect the backwater thrown up by paddle wheels and the water cast off by a screw propeller, so that it may flow nearly in a direction opposite to that of the vessel's progress.

"The curved blades or vanes may be carried by a cylindrical " case that is excentric with the axis of the screw, the cylindrical " case both enclosing the curved blades and also the screw."

[Printed, 8*d*. Drawing.]

A.D. 1864, April 13.—N° 932.

MILLER, Thomas William.—" Improvements in motive-power " engines."

The engines are " combined steam and atmospheric engines," and are constructed " with a four-sided chamber in lieu of a " cylinder." The piston is four-sided, and instead of piston rods, is fitted to a "moveable division plate" which divides the chamber into two parts.

" The working chamber of each engine consists firstly of two " planed plates for the top and bottom sides, each of which has " on its inward face, so as to divide the chamber into two parts " of equal capacity, a groove of the width and depth to receive " the moveable division plates; secondly, of two planed plates " for the right and left sides; thirdly, of two plates for the two " ends or covers, each of which has an oblong stuffing box for " the moveable division plate to work through; fourthly, of the " division plate, which moves in the grooves of the top and " bottom plates and through the stuffing boxes of the two ends, " and which has a vertical slot through it of a length equal to " the vertical diameter of the chamber, and of a width equal " to the thickness of the four-sided piston which traverses through " it. To guide the piston the division plate has projecting guide " pieces on each side of it, and at one end outside of the chamber " it has gudgeons for a connecting rod to be attached to, by " which the motion generated by the piston may be transmitted " to a crank.

" In the chamber described above, the four-sided piston, the " edges of which fit the four-sided chamber with its packings, " works from end to end, and traverses at the same time laterally " through the division plate, so that it produces on one side of " the division plate a gradually increasing surface, and on the " other side of it a gradually decreasing surface by its passage " during one stroke, and vice versâ, by its passage during the " reverse stroke. This chamber, in addition to its being divided " by the division plate, is also again divided by the piston, so " that it has four compartments or chambers of alternately " increasing or dimlnishing capacities, which may be distin" guished as, first, the right steam chamber; second, the right " atmospheric chamber; third, the left steam chamber; and " fourth, the left atmospheric chamber. Both the steam cham-

“ bers become alternately vacuum chambers by the action of the
“ condenser, whilst the two atmospheric chambers are left constantly
“ open to atmospheric pressure. The main chamber
“ thus sub-divided is provided with the necessary slide or other
“ valves for the admission of steam from the boiler, and for the
“ eduction of steam from the chamber into the condenser.

“ It is intended that an engine constructed with the parts above
“ described shall have in combination a condenser, air pump, hot
“ well, feed pump, and all the other well known appliances of an
“ ordinary steam engine. After blowing through, clearing the
“ condenser, and forming a vacuum in one of the steam chambers
“ when the steam is admitted by the valve through the steam
“ port, say, into the right steam chamber, its pressure, together
“ with the atmospheric pressure in the left atmospheric chamber,
“ causes the piston to move towards the end farthest from the
“ port by which the steam enters, there being a vacuum at the
“ other side of the piston in the left steam chamber, which is at
“ that time in communication with the condenser, and during
“ this stroke the piston will expel the air from the right
“ atmospheric chamber. On reversing the position of the valves,
“ the steam is admitted by another steam port into the left steam
“ chamber, when its pressure, together with the atmospheric
“ pressure in the right atmospheric chamber, causes the piston to
“ move in a contrary direction, there being at that time a vacuum
“ on the other side of the piston in the right steam chamber, also
“ in communication with the condenser. During the last and all
“ succeeding strokes of the piston, while the valves admit the
“ steam into the chamber on one side of the piston, they allow
“ the steam to escape from the chamber on the reverse side of
“ the piston through the eduction passages into the condenser.”

The claims are :—

“ First, the general construction and arrangement of combined
“ steam and atmospheric engines.”

“ Second, the constructing of motive-power engines so that the
“ power is obtained from the combined pressure of the steam in
“ the generator above the atmospheric pressure, and the pressure
“ of the atmosphere in conjunction with a vacuum exerted conjointly
“ upon the surfaces of a piston working simultaneously
“ in the steam and atmospheric compartments of a main chamber,
“ whether such engine be double or single-acting.”

"Third, the combination in motive-power engines of a four-
" sided chamber with a rectangular piston made to slide laterally
" through a moveable division plate whilst traversing from end
" to end of the chamber, and working steam and air tight in the
" chamber and moveable division plate."

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1864, April 14.—N° 938.

MEIRAT, Yenn. — (*Provisional protection only.*) — "Improvements in the means of propelling vessels."

Water is admitted by an opening in the bows and conducted to a turbine or hydraulic apparatus. It then escapes at the stern. " The difference of elevation in the ingress and egress apertures " gives a fall of water, which is utilized in and actuates the " turbine." The propeller is driven by the turbine.

[Printed, 4*d.* No Drawings.]

A.D. 1864, April 27.—N° 1061.

BATEMAN, Samuel. — "Improvements in paddle wheels of steamboats."

Instead of the paddles being fixed on the shaft they work in slides or sockets.

" On each end of the shaft an excentric is fixed to the framing
" of the drum by means of bolts. It is provided with a groove
" into which the paddles run; these carry at their lower extremity
" a pin. The shaft of the wheel turns freely in the excentric.
" When the wheel rotates, the paddles being maintained in the
" direction of their length by the socket and in a centre relative
" to the shaft by means of bolts, they follow a movement from
" fore and aft; therefore when they have arrived at the end of
" their course, that is to say, at the moment they touch the water,
" the arm of the lever is shortened of half of its length, whilst
" the opposite lever is increased of the same length. By this
" means a greater force is obtained as soon as the paddle reaches
" the water, and the resistance of the backwater is therefore
" lessened on account of the lever being shortened when it rises
" out of the water."

[Printed, 10*d.* Drawing.]

A.D. 1864, April 28.—N° 1065.

PARKER, JAMES.—(*Provisional protection only.*)—"Improvements in the application of steam combined with air as a motive power, and for other purposes."

This is partly an improvement on No. 2620, A.D. 1863; it consists,—

"1st, in heating the receiver or cylinder or the communications thereto by other heat than that contained in the steam, so as to superheat or surcharge with heat the combined steam and air, and thereby obtain a further expansion or increase of bulk or quantity of steam and air."

2nd. A "further increase of motive power" is obtained "by using the steam and air, after it has been once used in a cylinder at rather high pressure, by again combining or mixing the discharged steam and air with other atmospheric air, by passing the steam and air, on its discharge from the first cylinder, into a receiver, and from thence through other jets or apertures into other open air nozzles or pipes communicating with a second cylinder or receiver in conjunction therewith, and after it has been thus used as or to obtain motive power, it is conducted directly to the furnace or to a receiver, or pipes or channels leading thereto."

3rd. "After the steam and air has been used as motive power in an engine, it may be partially cooled or condensed by bringing it into contact with cold water, or by passing it through pipes in contact with cold water, or into a surface condenser, by which means some of the steam will be condensed and a supply of fresh aerated water obtained."

4th. The "cooled or partially condensed steam" may be used "as motive power in engines with cylinders having flexible sides" made of "leather, or canvass, or other textile material" coated with india-rubber or otherwise.

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 29.—N° 1085.

HARVEY, JOHN.—(*Provisional protection only.*)—"Improvements in machinery or apparatus for obtaining and applying motive power, applicable to propelling ships and vessels, raising water, and other useful purposes."

The apparatus consists of an iron cylinder, closed at top and bottom. It is "divided midway by a fixed plate or disc." "Above and below the disc, and midway between the covers of "the cylinder and the fixed disc, is a moveable plate, disc, or "piston, the two being connected by a vertical piston rod passing "through a stuffing box in the centre of the fixed disc."

Some "rapidly combustible hydrocarbon" is conveyed by a pipe alternately above or below the piston. This is lighted and a vacuum produced. Suitable valves admit air to the other side of the piston. The cylinder may be connected with a suction pipe, in a manner not described, so that water may be drawn in at the bows and ejected at the stern to propel the vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 13.—N° 1215.

BROOMAN, Richard Archibald.—(*A communication from Jean Baptiste Guignes and Ange Chusin.*)—(*Provisional protection only.*)

"This propeller consists of a cylinder or tube to be fixed on a "propeller shaft with a spiral flange to which to secure the screw, "the shape of which is that of two volute spirals, each springing "from opposite ends of the cylinder, and joining in the centre. "The screw may be composed of several blades bolted or rivetted "together, or may be formed of one or two pieces."

[Printed, 6*d*. Drawing.]

A.D. 1864, May 14.—N° 1222.

GRIFFITHS, Robert. — "Improvements in propelling ships "or other vessels."

A screw is mounted at an angle of about 45° to the sternpost, the end of the screw "looking downwards and towards the bow." A short shaft passes through the screw, and is connected by suitable gearing with the main shaft of the engine.

Two propellers may be used, one under each counter; or two "inclined screws" may be used in addition to the "upright or "ordinary screw;" or three "perpendicular screws with horizontal shafts" may be employed, one on each quarter, and the centre one forward of the others, and receiving its supply of water through a channel or recess in the bottom of the vessel. This arrangement may be slightly varied.

The object of the improvements is to supply the screw with water and overcome the tendency of the screw to drive water away behind faster than it can be supplied in front.

[Printed, 1s. 10d. Drawings.]

A.D. 1864, May 19.—N° 1263.

BAUER, William.—"New and improved self-acting governors, " applicable to marine and stationary steam engines, and to " other motive-power engines."

Two sorts of governors are described, one available for marine, the other for various descriptions of engines. In the former, " the variation in the level of the water outside the ship in the " immediate proximity of the screw, paddle, or other propeller," is made to act on the governor. A float rests on the water in a cylinder connected with the external water. A rod from this float actuates valves for regulating the admission of steam. When the propeller is raised out of the water, the float falls and reduces the power of the engine. A horizontal cylinder with a piston may be used in a similar way. The other governor consists of a tube, closed at one end, and bent into the shape of the segment of a circle. It is fitted with a piston of like shape. This is adapted to the main shaft in such a way that the piston is driven further into the tube, and the air compressed according to the load on the engine. This motion of the piston is conveyed by suitable mechanism to the valves.

[Printed, 10d. Drawing.]

A.D. 1864, May 25.—N° 1304.

WIMSHURST, Henry.—"Improvements in fitting screw and " similar propellers for propelling ships and vessels."

"This invention consists of fitting screws and similar pro- " pellers in such manner that greater facilities are given to raise " the propellers out of the water, also freeing the vessel from " dragging the posts and other parts through the water. The " screw or other propellers not only work abaft the rudder, but " the same arrangement will apply to those worked or placed one " under each run of the vessel, and are so arranged that when " desired are capable of being raised with the aftermost length " of shafting assuming an angular position, the propeller being

" then under the stern of the vessel out of the water, and for " such purpose a long slot the size of the shaft is constructed on " either side of the vessel, through which the propeller shaft " passes, and a trunk which is also constructed and made water- " tight; at the foremost end of the trunk there is affixed thereto " an improved stuffing box made to move on trunnions, so that " the shaft which passes through when it is being raised, will " cause the stuffing box to oscillate. When the after piece of " shafting is lowered on its bearings, then it will form one con- " tinuous length secured together without knuckle joints."

[Printed, 10*d*. Drawing.]

A.D. 1864, June 1.—N° 1356.

TAYLOR, JACOB.—(*Provisional protection only.*)—" Improve- " ments in propellers for ships and vessels."

The propellers are entirely immersed in the water. " Each pro- " peller consists of a hollow drum or cylinder having in its " periphery a number of openings forming the terminations of " slots or spaces between a similar number of blocks of wood or " metal fixed to the drum or cylinder, and in each slot there is " placed a blade or float. In the interior (or exterior if desirable) " of the drum at each side there are plates having eccentric " grooves into which are placed rollers or pins projecting from " the blades, and the plates and eccentric grooves are held " stationary or have revolving motion imparted to them as may " be required. When revolving motion is given to the drum " and the eccentrics are held stationary, the blades revolve with " the drum, and at the same time project and recede one after " the other, and when the longest radius of each eccentric is " below the driving shaft, the central projecting blade is per- " pendicular to the vessel's forward course, and when the " eccentrics are removed to the opposite position, the blade is " perpendicular to the vessel's backward course, and as the blades " recede one after the other, when they have done their work, " there is no loss or resistance from back pressure, and if the " eccentrics are turned during the revolving motion of the drum, " the vessel turns round as on a centre either with or without " the assistance of a rudder."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 2.—N° 1376. (* *)

NEWTON, William Edward.—(*A communication from William Lighthall.*)—This invention relates to apparatus for cooling the injection water of marine engines, and consists of a rectangular oblong case, constructed of metal plates bolted together; a chamber is formed across each end by tube plates, the edges of which are properly fitted and secured against the sides of the case so as to be water-tight. Numerous small tubes extend between these plates and form a direct communication between the end chambers, in which at one end, through a large pipe attached to the centre, the current of cooling water enters and courses through the tubes into the chamber at the other end, and thence away through a large pipe attached thereto. The injection water takes a lateral course between the tubes; it enters at one end of the tube chamber through a pipe attached to the side of the case, and by means of longitudinal diaphragms and transverse division plates, which only fit against three sides of the case, and alternately fall short of the fourth, the heated injection water is made to traverse the various sections of the apparatus from side to side, crossing and recrossing amongst the tubes containing the cold water a number of times, until it finally leaves through a side pipe at the opposite end of the tube chamber; this pipe is in communication with the condenser, where it conveys the water then in a cool state, to be re-injected. The injection water and the cooling water course through the apparatus in opposite directions. The invention also consists in obtaining a current of sea water through the tubes and apparatus by means of "shutes" which are so placed outside the vessel that, as she moves forward, the water is constrained to enter, and having passed through the apparatus, leaves the vessel through an opening further astern. Also in arranging the delivery pipe from the hot well, and the feed pipe thereto from the pump, in such relation to each other, that the amount of injection water used during the preceding revolution of the engine, shall first be returned to the refrigerator to be cooled for re-use, and the remainder of the water raised by the air pump, which is the result of the condensation of the steam used to effect the revolution, shall be returned to the boiler. Also in securing the tube ends in the tube plates by the use of a ductile metallic packing, secured round the tube ends within an enlargement made a considerable depth in the holes which are formed in the tube plates to receive them.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1864, June 3.—N° 1383.

CALVERT, William.—(*Provisional protection only.*)—" Im-" provements in the construction of ships' propellers."

The propellers are " submerged feathering paddles." They are placed " at midships or thereabouts," and may be used for turning as well as propelling the vessel. " They are formed each " of a flat plate of any desired configuration," and mounted on an inclined " spindle which passes through or has its bearing in " a boss at the extremity of the crank shaft of the propelling " engines, and is further supported by a bracket arm keyed to " the crank shaft. The bossed ends of this shaft turn in bearings " in the side walls of the vessel. Keyed to the inner end of each " inclined spindle is a cogged wheel, which through an inter-" mediate pinion is connected with a bevil wheel mounted closely " on the crank shaft. Coupled with this bevil wheel is a worm " wheel, into which gears a screw shaft that reaches up to, say " the deck of the vessel. This shaft receives axial motion from " gearing worked by hand for the purpose of adjusting the paddle " (through the gearing already described) to its proper working " position. By turning the screw shaft of one of the paddles so " that the position of that paddle will be the reverse of the one " on the opposite side of the vessel, and continuing the rotation " of the crank shaft, the paddles will be caused to act in opposite " ways, and thereby without the aid of the rudder turn the vessel " quickly round.

" By means of the gearing already described, the position of the " paddles with respect to the water in which they are acting " is during the rotation of the crank shaft reversed, so that their " opposite edges alternately become the foremost edges of the " paddle."

[Printed, 4*d.* No Drawings.]

A.D. 1864, June 22.—N° 1568.

SHAW, Frederick.—(*Provisional protection only.*)—" Improve-" ments in the propulsion of steam ships."

"In the bilges of the vessels near the stern" are constructed "two tubes or cylinders, one on either side, of about twelve feet "in length, the fore openings to curve downwards through the "bottom of the vessel in a slanting direction towards the bows to "admit the water, the opposite ends of the cylinders to terminate "in the rim of the vessel's stern under each quarter; in each of "these tubes or cylinders" there works a screw propeller "set "on a shaft deriving motion from a steam engine.

By this mode of propulsion the following advantages are said to be obtained:—

"1st. The impossibility of fouling the screw by wreck or other "material.

"2nd. The constant immersion of the screws.

"3rd. The obviation of the disagreeable sensation experienced "in all screw vessels constructed upon the ordinary method, "caused by working the screw at the extreme end of the "vessel.

"4th. The facility with which a vessel constructed upon this "principle can be steered by reason of the column of water being "driven through the cylinder direct upon the rudder; and in "case of need a vessel can be steered by means of the screws "alone without the aid of a rudder, and can be turned about "at will.

"5th. Complete protection giving to the propelling medium, "the screws being worked inside the tubes offer no mark for "shot, particularly applicable for line-of-battle ships.

"6th. Increased speed obtained by the economic appliance of "the whole power of the engine upon the propulsion of the vessel, "a result which cannot be effected upon the ordinary plan, a "great per-centage of wasted power being indissolubly connected "with the method of driving screws in open water."

[Printed, 4d. No Drawings.]

A.D. 1864, July 5.—N° 1665.

AITCHISON, Robert Ker.—"Improvements in apparatus for "steering vessels."

The screw is mounted in the rudder on a short shaft or spindle connected to the propeller shaft by a universal coupling joint. The screw thus acts in the direction of the rudder, not in that of the *ship's keel, when* the rudder is on. The ship can be manœuvred without having any previous "way" on her. The screw in the rudder may be a second, or additional screw. The screw should be one with two vanes only. The remainder of the specification deals with steering mechanism.

[Printed, 10*d*. Drawing.]

A.D. 1864, July 12.—N° 1728.

HADFIELD, William.—(*Provisional protection only.*)—"Improvements in machinery for propelling steam-boats and other vessels."

"This invention consists in the construction and employment " of one or more cylinders and plungers in connection with one " or more steam engines, and also working in connection with or " independent of the ordinary paddle wheels or propellers. Each " cylinder is placed in a horizontal or angular position, and has " at one end a cover provided with a stuffing box, through which " is passed the rod of the plunger, which rod is connected with " the steam power so as to have to-and-fro motion, and the other " end of the cylinder is open to the water, there being a damper " or valve to shut off the water when required. Each plunger is " pushed by the steam power against the water, so as to exert a " propelling force in proportion to the diameter of the plunger " and the pressure given to it, and at the return or backward " stroke of the plunger, the water follows it up and gives an " additional force to propel the vessel according to the depth the " plunger is below the level of the water."

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 21.—N° 1818.

LEES, Robert.—(*Provisional protection only.*)—"Improvements in the adaptation of screw propellers for ships or vessels."

" The invention is designed for the purpose of obtaining " more propelling power from the same mechanism now in " ordinary use, which is obtained by the novel position of the " propeller employed.

" The improvement consists in applying or adapting any " ordinary screw propeller to the front or 'bow' of vessels instead " of to the 'stern,' by which alternation" "a considerable " increase of speed is obtained."

[*Printed*, 4*d*. No Drawings.]

A.D. 1864, July 23.—N° 1836.

OSLER, Abraham Follett.—(*Provisional protection only.*)—
" Improvements in constructing and propelling ships and other " floating vessels." Near either end of the ship a horizontal shaft is situated, each shaft working in bearings on either side of the ship; the said shafts are situated in a plane about midway between the upper and lower surfaces of the ship. Each of the shafts carries at each end a wheel, which wheels are not circular, but of an octagonal or of other angular figure. The diameter of the wheels is somewhat greater than the depth of the ship. Upon the wheels two jointed endless chains work, the chains passing over and under the ship; these chains are made of metallic bars of a length equal to the distance between two contiguous angles of the wheels. To the outer sides of the endless chains transverse tubular closed vessels or floats are fixed, and on the inner side of the chain rollers or antifriction wheels work. The floats described are of such size that that portion of the series always under the ship is buoyant under the heaviest load of the ship, hence the ship itself does not rest upon the water, but is supported above it by the floats. When the ship is placed upon the water, and a propelling force is applied to it, it is made to advance upon the rollers or antifriction wheels on the endless chains, the floats immediately under the ship remaining stationary, or nearly stationary. " By the advance of the ship, the wheels on which " the endless chains work advance and rotate, the state of rest " of the lower part of endless chains causing the upper part to " travel over the upper part of the ship in the direction of the " ship's motion, and with double the ship's velocity. By the " motion described, the endless chains lay down floats in advance " of the ship, and take up those at its rear, the ship at the same " time travelling upon the rollers or antifriction wheels between it " and the endless chains. By the construction described there is " formed as it were, a floating platform, carrying rollers on which " the ship travels, the said floating platform being simultaneously " laid down in advance of the ship and taken up at its rear. The " ship travels on the rollers of the said floating platform without " encountering the resistance which would be produced by its " motion through water."

Ships constructed according to this invention may be propelled " by the action of the wind upon sails. When the ship is

" propelled by steam or other motive power contained within the " ship, the said motive power is applied to produce the rotation " of the shafts described; by the rotation of the said shafts the " ship is made to advance."

[Printed, *4d.* No Drawings.]

A.D. 1864, August 3.—N° 1925.

JOHNSON, John Henry. — (*A communication from John Harris.*) — (*Provisional protection only.*) — "Improvements in " machinery or apparatus for propelling and steering ships, partly " applicable also to the ventilation of mines and buildings, to the " pumping of water, and to the obtainment of motive power."

"This invention relates, firstly, to certain peculiar arrangements " of mechanism for giving a reciprocating horizontal motion or " an oscillating motion to a feathering paddle for propelling or " steering ships, such paddle being so constructed that the vanes " will be closed when the paddle is moving in one direction, and " open when moving in the contrary direction."

In one mode of carrying out the invention, a vertical frame is swung from an axle. To the lower end of this frame vanes are attached mounted on spindles. These vanes are connected together and capable of being moved or "feathered" by a rod. Two arms from two socket shafts actuate the propeller. One, which is longer than the other, oscillates the frame, and the other strikes against tappets on the rod actuating the vanes, and "feathers" them as each stroke is completed. Instead of the two rocking shafts, a crank and an eccentric on the same shaft may be employed, or a horizontal vibrating beam. Various means for connecting together the vanes may be used.

In another mode the frame works along horizontal guides, instead of swinging, and the mechanism is modified accordingly.

[Printed, *4d.* No Drawings.]

A.D. 1864, August 6.—N° 1965.

COUSINS, Sidney Leslie. — (*Provisional protection only.*) — " Improvements in the construction of and propulsion of boats " applicable to their conveyance either on shore or afloat."

A boat "to be conveyed over land on wheels," constructed " *with* one or more frames, which support the weight of the boat. The inventor prefers to use two longitudinal frames, "thus "obtaining the requisite strength of structure without the additional weight of a carriage. It can be propelled both on land "and afloat by means of a cranked axle, turning wheels with "paddles attached, the cranked axles being turned by hand or "foot power, or both combined. The boat, however, may be "drawn overland by animal or other motive power in the usual "manner, and may be propelled through water with oars, sails, "or the usual appliances, should these means of propulsion on "any occasion for any reason be found desirable. It may be "steered on land by a wheel, which acts as a rudder when in the "water."

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 8.—N° 1968.

RUNKEL, Mark.—(*Provisional protection only.*)—"An improved automatical regulator for marine steam engines."

The regulator consists of a pendulum swung in universal joints. At its top is a segment of a circle and an excentric. The lever of the throttle valve rests against the segment when the pendulum is at right angles to the keel, but when the ship pitches and swings the pendulum the excentric is brought against the throttle valve and "governs it accordingly." The object is to lessen the speed of the engines when by the pitching of the ship the propeller is lifted out of the water.

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 20.—N° 2065.

WHITE, John Garrod.—(*Provisional protection only.*)—"New "or improved mechanical arrangements for propelling ships or "vessels."

The inventor uses "machinery in which the floats, propellers, "or paddles constantly describe an oval or elliptical curve by "means of a travelling center, while at the same time they are "maintained during the stroke in that position which is most "advantageous." By means of a connecting rod the paddles are to be raised, so as to accommodate them to the draught of the ship, or to raise them out of the water when the ship is being sailed. On this connecting rod is an iron pin, which slides "through holes in two travelling beams." "The arms or levers" whereby the paddles are worked are attached by universal joints to the travelling beams. The paddles may be moveable.

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 31.—N° 2139. (* *)

ANDREUX, JEAN BAPTISTE, and COULON, EUGÈNE.—This invention, relating to "the application of a combination of steam "and air as a motive power to ships and vessels of all descrip- "tions," consists in generating steam in a boiler of suitable shape and size, wherein is spirally coiled a superheating copper tube, through which the steam passes by means of a small nozzle or jet direct into a second tube, the entrance to which is slightly bell-mouthed, so that a thin annular air passage is formed between the contiguous ends of the two tubes; during the rush of the steam from one tube into the other, the air is drawn in through the thin air passage, and mingles with the steam in the second tube, which is connected to pipes extending through the stern of the vessel and opening outside below the water line; branch pipes may lead from the second tube through the sides of the vessel, and be suitably curved outside towards the stern. The constant combined stream of superheated steam and air issues from the open end and branches of the second tube so as to strike against the water in the direction of the helm, and (it is stated) "aid in propelling the ship."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 2.—N° 2160.

BARLAND, MARGARET. — (*A communication from Thomas Barland.*)—"Improvements in obtaining motive power and in "applying the same to the propulsion of ships or vessels con- "structed therefor, and to other useful purposes."

A great part of the Complete Specification is taken up with a description of a peculiarly-shaped ship to which the new method of propulsion is to be applied. This method consists in setting windmills on deck, having their sails screened from the wind on one side, so that the wind only acts upon half the sails. The power thus obtained drives a propeller.

[Printed, 6*d*. No Drawings.]

A.D. 1864, September 10.—N° 2210.

LILLIE, Sir John Scott.—(*Provisional protection only.*)—"Improvements in the apparatus used in propelling by atmospheric "pressure or steam power, or both combined."

The first, second, and fourth parts of this invention relate to the propulsion of carriages. The part relating to marine propulsion is as follows:—

"The third part of my invention consists in propelling vessels "without the aid of a screw or paddle; to accomplish this part "of my invention I place the engine on board a boat, which I "call the propelling boat; attached is a shaft from the boat, "which is moved by the engine. At the end of this shaft is a "V wheel or pulley, which runs upon an iron rail supported on "posts or otherwise on or beside the bank of the canal or river; "this rail should be about 18 inches or more above the surface "of the water. I place another wheel or pulley underneath this "V pulley, so as to bite or grip the rail with the V pulley; this "under pulley is supported by the framework which carries the "shaft of the V pulley. When the engine moves the shaft and "the V pulley, it will move the boat. By this mode of applying "the power I do not disturb the water, as is done by screws or "paddles, and the banks of the canal or river are not so much "destroyed accordingly."

[Printed, 4d. No Drawings.]

A.D. 1864, September 13.—N° 2251.

DEAN, John.—(*Provisional protection only.*)—"Improvements "in marine steam engines." An "air ball" or float is attached to a rod within a tube near each paddle or other propeller. When the propeller is raised out of the water, the ball falls and, by suitable mechanism, closes the throttle valve, thereby preventing increased velocity on the part of the engine. There should be an engine to each propeller, which is consequently worked independently.

[Printed, 4d. No Drawings.]

A.D. 1864, September 14.—N° 2266.

THORNTON, Francis.—(*Provisional protection only.*)—"Improved arrangements for propelling ships and vessels."

"The invention consists in placing and using screw or blade
" propellers, so that one propeller shall act upon the water in
" an opposite direction to the other :—To the shaft proceeding
" from the engine (usually adopted for screw propellers), and at
" or near the end thereof," is "a toothed wheel gearing with
" another wheel or another shaft secured to the ship or vessel by
" framing, and placed at right angles to the said shaft from the
" engine, this latter shaft having a suitable number of propellers
" (four for instance) keyed thereon (say two propellers on each
" side of the ship for instance) such propellers being so secured
" that whilst one propeller is perpendicular, the other on the same
" side of the keel line of the ship or vessel is horizontal. Instead
" of the propellers being all keyed on one and the same shaft,
" two shafts may be used connected by gearing with the aforesaid
" shaft from the engine. In this case each shaft may be moved
" independently of the other, and if desirable each of the pro-
" peller shafts may be worked from a separate engine."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 24.—N° 2346.

CLIMIE, DANIEL.—(*Provisional protection only.*)—"Improve-
" provements in life boats."

Steam power is applied to the propulsion of life boats. The boats are to be large, and carry an engine or a pair of engines of about ten horse power. The engine and boiler are to be very light. If the boat be propelled by "one, two, or three screws" rotary engines are to be used, reciprocating if paddles are employed. The compartment enclosing the engine and boiler is decked in, and has tubes carried up so that the sea may not wash into it. A double skin is to be applied to the engine compartment. The boiler may be multi-tubular, and of sheet steel.

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 30.—N° 2405.

VINE, JAMES.—(*Provisional protection only.*)—"New or improved arrangements for giving buoyancy to and facility for the propulsion of ships, vessels, or floating bodies."

"Cylindrical boxes or pontoons" provided with floats or propelling blades, and actuated by an engine, are attached in pairs on either side of the ship.

[*Printed*,

A.D. 1864, October 4.—Nº 2441. (* *)

MONRO, Alexander.—" An improved mode of and apparatus " for heating steam boilers." The heat from the fuel is communicated to the boiler through the medium of a substance, by preference lead, which is fusible at the working temperature. Two instances of boilers worked in this way are described. A boiler, somewhat resembling a common two-flued boiler, has the bottom of the two-flues united to form a U-shaped flue, in the front end of which is the furnace. This flue is surrounded by two shells, the intervening space between which contains lead introduced in a melted state by pipes. Ducts are formed through the upper part of the boiler, communicating with the tops of the U-shaped furnace space, for the introduction of the coals. The tops of the ducts are fitted with doors, and a vertical grating, furnished with a series of plates, is adapted to the front end of the furnace. A marine boiler, with this lead bath, is shown with an internal furnace space occupying the lower part of the boiler, the fire gases returning through tubes to the take-up. " The roof of the furnace " space is made of a deeply-undulated form to give extended " heating surface, and the roof and sides are made with two shells " with an intermediate space filled with lead.

[Printed, 10*d*. Drawing.]

A.D. 1864, October 6.—Nº 2464.

FONTAINE MOREAU, Peter Armand le Comte de.—(*A communication from Pierre Charles Nesmond.*)—(*Provisional protection only.*)—" Improvements in machinery for propelling."

"The invention relates to steam propellers (the steam being " produced by evaporation or by the combustion of a gas capable " of producing it without condensation) being with double " action " in which the draught is "the result of the afflux of " some part of the air which the vehicle containing the motive " power rapidly displaces or compresses by its progressive forward " movement." Openings in front of the machine admit the air which is conducted to the furnace. The steam escaping from the discharge pipe is allowed to escape in a backward direction so that its reaction may assist the forward motion of the boat or vehicle.

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 7.—N° 2478.

JACKSON, Addis.—(*Provisional protection only.*)—" Improvements in constructing and arming ships and other vessels or " floating bodies."

An armour-plated ship with three keels is described:—It " is " propelled by two screws on the same screw shaft, each screw " consisting, by preference, of two blades; they are placed a " considerable distance apart from each other, and in the circle " they move in they are so arranged as to be 90° in advance of " each other. In addition to these two screw propellers on the " same shaft, two other screw propellers are employed, arranged " one on each side of the middle keel, and working in the " spaces between the middle and outer keel; these two propellers " work in an opposite direction to the others. They also " assist in steering the vessel, they being worked by separate " engines. Two other propellers are also employed; they are " placed about midway between midships and the bow of the " vessel. The axis of these last-named propellers, instead of " being parallel with the centre keel, are placed at an angle " thereto, the one on each side thereof; this is for the purpose of " assisting the turning of the ship, and also to assist in increasing the speed of the vessel when moving forward to act as a " ram or otherwise."

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 10.—N° 2488.

VAILE, Samuel.—(*Provisional protection only.*)—" Improvement in propellers and in propelling ships and other vessels."

The invention consists in " propelling by the combination of " frictional and float surfaces."

The " propellers consist of one or more wheels or discs having " floats " " radiating from the centre to the outer circumference. " The outer part of each propeller consists of a disc, by preference, thick or wide at the axle, and tapered to a thin edge;" floats are hinged to this disc, and the hinges project " so as to " allow the water to pass clear between the disc and the floats. " The floats are made to feather by means of arms projecting " from the upper part of the floats, working in a grooved guide " in conjunction with a movement attached to the shaft." Sometimes *fixed* floats are used, and " in order to take the way off the

" ship, a portion of the disc and hinge is split so as to open " out," or "a hinged flap or flaps" is applied, to which are attached "chains or rods, whereby to open out the flap and close " it as required."

[Printed, 4*d.* No Drawings.]

A.D. 1864, December 17.—N° 2565.

NEWTON, WILLIAM EDWARD.—(*A communication from Alban Crocker Stimers.*)—" Improvements in the construction of marine " steam boilers."

The tubes of a horizontal tubular boiler are arranged in vertical, as well as horizontal rows, and the diameters of the tubes of the upper vertical rows are less than those of the lower tubes. By this the vertical water spaces are greater at the top of the boiler than at the bottom. This effects a more quiet disengagement of the steam, as the heat is absorbed more evenly.

[Printed, 10*d.* Drawing.]

A.D. 1864, October 18.—N° 2571.

REID, JAMES.—(*Provisional protection not allowed.*)—" Im- " provements in the construction of waterwheels, paddles for " propelling vessels, water pumps, and churns."

" This invention consists in the use of a closed cylinder or drum " attached to and rotating with a central axis or shaft, round the " periphery of which are placed a number of buckets or blades " moving on hinges, and attached at their outer extremities to " links are arms connecting them with circular discs by which " their motions are regulated; these circular discs move round " eccentric drums rigidly fixed."

[Printed, 4*d.* No Drawings.]

A.D. 1864, October 24.—N° 2626.

COLLEY, EDWARD EDWARDS.—" Improved propellers."

" This invention consists of improved propellers, combining " the action of the screw and paddle in each. The improved " propeller is formed by fixing a number of blades upon an axis " at an angle therewith of 40°, more or less. The propellers are " fitted at the stern of the vessel, one on each side of the rudder, " the centre line of their axes forming a horizontal right angle, " or each forming an angle of 45° with the centre line of the

" keel. The propellers are coupled, and driven by an ordinary " engine. The propellers are intended to operate when wholly " or partly submerged. The axes of the propellers are mounted " in bearings, which can be raised and lowered by screws."

[Printed, 8*d*. Drawing.]

A.D. 1864, November 8.—N° 2771.

HALL, William King.—"An improved method of raising " screw propellers."

The invention is to be applied to ships not provided with screw wells. The screw is to be raised above the water line by two threaded rods, the lower ends of which are attached to the braces in which the screw revolves, and the upper are carried through the ship, and have nuts which can be screwed up simultaneously by a toothed wheel. If it be desired to bring the screw on deck, after it has been raised above the water-line, a shackle is placed on each of the screw blades, the screw is slung, and hoisted on deck by a tackle.

[Printed, 6*d*. Drawing.]

A.D. 1864, November 9.—N° 2779. (* *)

GALLOWAY, George Bell.—This invention relates to the production of motive power, by the use of atmospheric air in connection with water under hydraulic pressure, and also to the means for the prevention of boiler explosions. Reference is made to former Letters Patent granted to this inventor dated respectively October 31, 1857, No. 2765, and March 15, 1859, No. 651, which relate to the propulsion of vessels, steering appliances, and boiler explosions. Regarding the present invention, the engine for marine propulsion is of the rotary class, similar in form to those in use but, differing in the internal arrangement, the construction being similar to a water wheel, upon the arms and cellular spaces or buckets of which the full impulsive force of the steam, water, or air is directed. The frictional surfaces are relieved by the application of metallic rollers clothed with india-rubber, so that travelling surfaces are presented to the revolving piston or cylinder. The pump is constructed with a valve both at top and bottom, each acting in unison with the strokes of the piston, whereby the assistance of the pressure of the atmosphere is obtained to assist the motive power in compressing at each stroke of the pump, in either direction, both water and air, which are received and compressed and leave the pump through two delivery pipes, wherein there are valves which open and close with the action of the piston. These pipes lead out below the stern of the vessel, where the compressed air and water issue with force against the external water and so cause propulsion. Steering is effected by the force of compressed air and water which, through pipes suitably applied, issue laterally from the stem of the ship, and also, if required, from or about the stern post in the same lateral direction. Boiler explosions are prevented by drilling the rivet holes about two inches from the edge of the plates; also by applying internally, soda ash or other suitable matter to prevent incrustation, and putting within the boiler, ligneous or other substances, such as manganese or similar matter in a liquid state, in order to change the quality of the water; also by the use of a metallic conducting wire, which is passed through the shell of the boiler, drawing off the electricity generated therein; extra strengthening is given to the boiler by covering the seams with plates of iron or steel.

To obviate the vibration, increase the speed, and improve the steering qualities of steam ships, the patentee proposes to fix two of his propellers upon one boss.

[Printed, 4*d.* No Drawings.]

A.D. 1864, November 18.—N° 2890.

JONES, Edward Stewart.—(*Provisional protection only.*)—
" Improved means of obtaining and applying motive power for
" the propulsion of navigable vessels."

Air is compressed into reservoirs and stored away in the ship. It is used to work the engines or made to propel the ship by discharging it into the water. Its lightness, and its obviating the necessity for carrying fuel, are the advantages claimed.

[Printed, 4*d.* No Drawings.]

A.D. 1864, November 21.—N° 2899.

MACINTOSH, John, and THURGAR, Augustus Henry.—
" Improvements in propelling boats, and in apparatus connected
" therewith."

The object is to obviate the necessity of an oarsman having to sit with his back in the direction in which he is going. For this purpose the oar is made double, and there are two rowlocks to each oar, the joint of the oar working in the centre between the two rowlocks. By this means the blade and the handle move in the same direction.

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 1.—N° 2996.

TAYLOR, Jacob.—(*Provisional protection only.*)—"Improve-" ments in propellers for ships and vessels."

Each propeller consists of a hollow drum "having in its peri-" phery a number of openings forming the terminations of slots " or spaces between a similar number of blocks of wood or metal " fixed to the drum." In each slot is a float. "In the interior " of the drum at each side there are plates having eccentric " grooves, into which are placed rollers or pins projecting from " the blades, and the plates and eccentric grooves are held " stationary, or have revolving motion imparted to them, as may " be required." When the drum revolves, and the eccentrics are stationary, the blades revolve with the drum, "and at the " same time project and recede one after the other, and when " the longest radius of each eccentric is below the driving shaft, " the central projecting blade is perpendicular to the vessel's " forward course, and when the eccentrics are removed to the " opposite position, the blade is perpendicular to the vessel's " backward course, and as the blades recede one after the other " when they have done their work, there is no loss or resistance " from back pressure, and if the eccentrics are turned during the " revolving motion of the drum, the vessel turns round as on " a centre." Similar effects may be produced by making the " exterior of the drum "work eccentric with the blades." " A number of blades" may be placed "in the arms of a wheel " or drum fixed to a revolving shaft, and to each blade is fixed " a toothed wheel gearing into a rack, to which to-and-fro motion " is given by a stationary cam, so that as the shaft and blades " revolve, the blades shall partly turn to and fro on their axis, " and thus be feathered."

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 1.—N° 3003.

ROBERTS, Martyn John.—"Improvements in means or ap-" *paratus for* reducing the friction now produced by the longi-

" tudinal or endlong pressure of ships' screw propeller shafts, or " of any upright or inclined shafts when revolving."

The end of the shaft is received in a cylinder full of liquid, with or without an elastic air chamber attached to increase the elasticity. The cylinder is kept full by a force pump, which either works continuously, the superfluous fluid being allowed to run away through a valve, or it is automatically actuated either by the shaft itself, or by a piston in a tube communicating with the cylinder. The shaft may work through a stuffing box, and it may be either wholly supported by the fluid, or partly by bearings.

[Printed, 8*d*. Drawing.]

1865.

A.D. 1865, January 5.—N° 29.

WATSON, William.—" Improvements in apparatus for propelling vessels."

The invention relates to the propelling vessels by drawing in and ejecting water. In one modification a transverse horizontal shaft has attached to it a drum working in an elliptical chamber, and in contact with its bottom. The ellipse has its shorter axis vertical. A blade works in a slot in the drum, and its outer edges project beyond the drum and work in contact or nearly so with the inner surface of the ellipse. Passages are formed in communication with the bottom of the chamber, one forward, and the other aft of its lowest point. When the drum is revolved, water is drawn in at one passage, carried round the chamber by the blade, and ejected at the other. By this means the vessel is propelled. In other modifications the drum may be against the top of the chamber, and there may be two paddles at right angles; or more than one elliptical chamber may be used " with " their axis horizontal, inclined, or vertical."

[Printed, 10*d*. Drawing.]

A.D. 1865, January 7.—N° 55.

GALLOWAY, George Bell. — " Improvements in motive " power, and means of communication between passengers while " travelling, and appliances connected therewith."

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obtain increased speed of the
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called planet motion wheels."
does not refer to this series.
No. 2765, A.D. 1857, and No. 651,

January 17.—N° 145.

John — (*Provisional protection*
The apparatus of my invention
on a shaft, to which I desire to
this cylinder I cut a double incline
of the groove encircling the cylin-

" der, the one-half of its circumference, and the other in like " manner encircling it the other half; they meet in a sharp angle " at either extremity, and, in fact, form a continuation of the " same groove. I apply a pin with or without a truck roller in " this groove, such pin and roller being mounted on a lever or " other part having reciprocating motion, the moving of which " to and fro causes the traverse of the roller in the cam groove " and the rotation of the cylinder, the movement in the one " direction taking place in the groove on one side of the cylinder, " and the reverse movement on the opposite side, the incline of " the cam being in the opposite direction; thus a continuous " rotary movement in one direction is imparted to the shaft, " which may be transmitted to other shafts if desired, as well " understood, and may be used in propelling vessels, locomotive, " and other machines for actuating drills, lathes, and in other " mechanical appliances."

[Printed, 4*d*. No Drawings.]

A.D. 1865, January 19.—N° 161.

FARCOT, Emmanuel Denis.—" Improvements in oars, and in " the modes of actuating them."

The blade of the oar is made at an angle of "from 160 to " 179 degrees " with the shaft, and the front side may be " slightly concave." The blade may be formed of a frame with canvas, india-rubber, or other material stretched over it. The oar is suspended from a short mast in the middle of the boat, and a handle, to be grasped by the rower, is fixed some way down the loom. To counterbalance the weight of the oar, it is also hung " towards the middle of its length " by a spring; or friction rollers are applied to it, where it works on the side of the boat. The end of the oar being fixed, the rower in pulling it towards him, pulls the blade in the same direction, and can sit with his face towards the bows.

[Printed, 1*s*. Drawings.]

A.D. 1865, January 26.—N° 228.

HAMILTON, John, junior.—" Improvements in machinery for " propelling vessels."

The invention is " applicable to vessels when stern wheels are " used." " The bearings of the stern paddle-wheel shaft of a " vessel are supported in guides, which are curved to a radius

" struck from the end of the connecting rods, where they are " attached to the crossheads or slides of the piston rods of two " steam cylinders, which are fixed on an inclined framing, by " which the paddle-wheel shaft can be raised or lowered, and " fixed in any desirable position according to the dip it is desired " to give to the float bands of the paddle-wheel. The cranks on " the two ends of the paddle-wheel shaft are fixed at an angle to " each other, and they are respectively driven by connecting rods " worked by the piston rods of the two steam cylinders. The " bearings of the paddle-wheel shaft are lifted and lowered by " means of screw shafts put simultaneously in motion by bevil " gearing." Or the paddle-wheel shaft may be driven by an endless band from a drum on the main-shaft, working over a pulley on the paddle-wheel shaft. This pulley is to be coated with vulcanized india-rubber.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1865, February 6.—N° 321.

MARKHAM, Clements Robert.—(*A communication from William Graham McIvor.*)—" A new method for removing or " destroying the momentum of heavy bodies by means of an " elastic machine or machines, so as to prevent injury and " damage from concussion, applicable to ship cables, ship and " fort armour, railway trains, tenders to pier heads and floating " piers, gangways, breakwaters, and other similar structures, also " as a motive power."

The only part of this invention connected with the present series, relates to the propelling vessels by means of springs coiled within a cylinder. The springs are to be wound up by any motive power before starting from harbour. They may be used as auxiliary or sole propellers.

[Printed, 2*s*. 8*d*. Drawings.]

A.D. 1865, February 9.—N° 365.

BIER, Moses.—(*Provisional protection only.*)—" Improved " machinery or apparatus for propelling boats, ships, vessels, or " other floating craft and objects."

The blade of an oar is made of a frame fitted with valves so that it can be moved to and fro below water, instead of being raised to the surface. Two or more oars may be connected by rods.

[*Printed*, 4*d*. No Drawings.]

A.D. 1865, February 13.—N° 405.

TONGUE, John Garrett.—(*A communication from Hippolyte Salmon.*)—" Improvements in the construction, arrangement, and " mode of applying paddle-wheels for propelling boats or other " vessels."

Paddle-wheels are constructed with "a number of compart- " ments formed around their peripheries, the divisions in some " cases forming fixed paddles, and in others moveable paddles " are employed, which are projected outwards, and withdrawn by " suitable cam surfaces arranged so as to act upon the paddles " to project and withdraw them as required to propel the vessel." These paddle-wheels are fixed in walls in the interior of the vessel, and are worked in the usual manner. Beams are fixed on the vessel's bottom beside the paddles to protect them, or hollows for the same purpose are formed in the bottom. The paddle-wheels are said to be especially suitable for canals.

[Printed, 10*d*. Drawing.]

A.D. 1865, February 23.—N° 510.

HUGHES, John George.—(*A communication from Christopher Edward Dampier*).—" An improved screw propeller and an im- " proved application of the motive power to the propelling of " boats and steam ships, applicable also to other purposes."

The improved propeller is of two sorts, " simple or half- " spherical " and " duplex or entire-spherical." In constructing the blades of the first-named, from "two half-circular metal " plates of the substance and dimensions required," is removed " a sufficient portion of their centre to fit them to the shaft or " to a cylindrical tube " which forms a boss on which the blades are fixed. Another portion of the blades is next removed to " permit a free sideways escapement of water." The plates are then bent to the proper form. A cross shaft is fitted to the boss. The end of each blade is fixed to the cross shaft "at exactly " opposite sides of the boss, that end of the blade then " standing off the boss perpendicularly, the ends of the two " blades thus forming the cutting or deflecting edges of the " propeller." The sides are then " to be longitudinally placed " and securely fixed along the boss, each exactly opposite the " other from end to end, whereby each blade will partially cir- " cumscribe the boss in a slightly spiral line." " A shifting "angular plate" is applied to the "deflecting edges" of the propeller to vary "the angle of deflection."

The "entire-spherical" propeller is formed in the same way, except that four semi-circular plates are used, rivetted together in pairs, or two circular plates. These are secured along the boss as above described.

A cylinder, either fixed or rotating, is applied about the propeller, to confine "to an endwise direction," the column of water set in motion by the propeller.

[Printed, 10*d*. Drawing.]

A.D. 1865, March 4.—N° 602.

THOMAS, Luke.—"Improvements in side propellers for ocean "and river vessels."

The propellers are formed of discs, which "carry upon their "outer surface propelling fins or wings." They are placed in the position usually occupied by paddle-wheels, or elsewhere. They work almost or quite flush with the side of the vessel, the paddles only projecting. The paddles may be at any convenient angle; and can be disconnected and removed.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1865, March 4.—N° 613.

HUMPHRYS, Edward. — (*Provisional protection only.*) — "Improvements in combining marine steam boilers."

A set of marine boilers is arranged in three rows in a direction fore and aft the ship. The boilers of the central row are double, having furnaces and fire-doors on each side. The boilers in the other rows are single. The space between the row is sufficient to admit of stoking both sets of fires. It is preferred that the coal bunkers should not be between the sides of the ship and the backs of the boilers. The flues and steam pipes from the side rows are connected with those of the central row. Any one or more of the boilers may be shut off from the rest.

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 8.—N° 643.

DEAN, John.—"Improvements in marine steam engines."

A vertical tube is fixed on each side of the vessel, near the paddle wheels, in which an air ball rises and falls upon a guide rod. This guide rod works the throttle valve. The effect is to cut off the steam when the paddle is out of the water and the resistance of the water consequently removed from the wheel. Each paddle has a separate engine, and the throttle valve is operated separately.

[Printed, 10*d.* Drawing.]

A.D. 1865, March 17.—N° 748.

LAWRENCE, BENJAMIN. — (*A communication from Thomas Ewbank.*)—" Improvements in increasing the mechanical value of " steam as a motive agent."

Steam is passed from the cylinder to a second cylinder, instead of to the condenser. This second cylinder is open at one end and has a piston which is pressed down by the atmosphere as the condensation takes place. " By thus separately revolving the " contracting force, a greater amount of it is obtained."

A novel sort of condenser is described. A pipe " has a perpen- " dicular descent from the bottom of the condenser to the surface " of the water, in which it dips at an open vessel " " of about " 35 feet. The vacuum resembles that in the cylinder of a suc- " tion pump placed too high for the atmosphere to receive water " into it." The steam is discharged into the vacuum at the top of the tube, and when condensed pressed down again. Condensation is affected by the injection of pulverised ice or snow into the vacuum chamber. In marine engines, the exhaust steam pipe is carried to a sufficient height above the engine to enable it to be connected with the top of the condensing tube. A chamber at the lower end of the exhaust pipe receives the water that may condense within it.

[Printed, 8*d.* Drawing.]

A.D. 1865, March 24.—N° 828.

SIMONS, WILLIAM, and BROWN, ANDREW. —" Improve- " ments in dredgers."

The only part of the invention relating to the present series consists in the providing dredgers with propellers, to be worked either by the engine of the dredging machinery, or a separate engine. The dredger may thus be moved from station to station, or may move forward while dredging.

[Printed, 10*d.* Drawing.]

A.D. 1865, April 3.—N° 935.

GOLLINGS, William Cantrill. — (*Provisional protection only.*)—" Improvements in paddle wheels, parts of which are " applicable to other purposes."

An additional wheel is fixed on the beam of the paddle box, with its axle either above or below the axle of the paddle wheel. The paddles are kept perpendicular by means of a small crank connecting each of them with the additional wheel. The main shaft has an end bearing.

[Printed, 8*d*. Drawing.]

A.D. 1865, April 13.—N°. 1053.

ROSSELET, George.—(*Provisional protection only.*)—" A new " method of obtaining and applying water as a motive power for " propelling ships, boats, and other vessels."

Water is admitted through the side of a vessel to turn a hydraulic wheel. The wheel imparts motion to the propeller. Pumps raise and discharge the water after it has been used. These pumps may be worked by the wheel or by a small steam engine.

[Printed, 6*d*. Drawing.]

A.D. 1865, April 13.—N° 1062.

BROOMAN, Richard Archibald. — (*A communication from Pierre Samain.*)—" Improvements in apparatus for feeding boilers, " raising water, and propelling vessels."

" This invention consists of an apparatus which draws and " discharges cold water by producing a vacuum above hot water " by means of steam or dilated air, and by employing, in preference, as a distributor, a self-acting float, which regulates the " introduction and escape of the steam." " By alternately producing pressure and vacuum on the surface of hot water," is formed "a liquid piston with hot water for drawing and discharging cold water; this is the characteristic feature of the " invention."

The method " of drawing and discharging water may be " applied to the propulsion of vessels." Water is drawn "from " the front of the vessel " and discharged from the stern. The apparatus for propelling vessels is not described, but that used for raising water consists of a receiver connected at top and bottom with the boiler. A "syphon tube" leads from the receiver to a condenser above. A float in the receiver has two balls, one to close the passage to the condenser, the other to close the pipe from the bottom of the receiver. When the receiver is full of water, the float is raised and the passage to the condenser closed. Steam is admitted into the receiver, depresses the water, and consequently the float, and passes into the condenser. The pressure of the steam on the water in the condenser opens a valve in a pipe leading from it to the lower part of the receiver, and supplies the receiver with water. The float is thus again raised. The condensation in the condenser produces a vacuum, into which water is drawn through a pipe from the source whence it has to be raised.

[Printed, 1*s*. Drawing.]

A.D. 1865, April 18.—N° 1083.

BEDDER, WILLIAM.—"Improvements in the construction of " ships or vessels, or cars to float on water."

A vessel is supported above the water on two or more air-tight drums so as to be above the water, and consequently require but little propulsive power. These drums are caused to revolve by motive power engines. The drums in the drawing have paddles attached to them.

[Printed, 1*s*. Drawings.]

A.D. 1865, April 20.—N° 1107.

CAUDWELL, HENRY.—"Improvements in the construction of " ships of war and floating batteries, part of which improve-" ments are applicable to land fortifications."

Improvements in ships and batteries are described. A ship is steered by paddle wheels set at right angles to the keel, and " by preference, near the stern." "These wheels are below the " water line and enclosed within a case, except their lower floats, " which dip into a passage formed at right angles to the length " of the vessel, and open at both sides." The ship is to be propelled by a screw and paddle wheels driven by a combined engine. The paddle wheels are below the water line, and are " enclosed in cases to prevent the entrance of water into the " vessel."

[Printed, 1s. 4d. Drawings.]

A.D. 1865, April 21.—N° 1118.

GRIFFITHS, Robert.—(*Provisional protection only.*)—" Im-" provements in screw-propelling apparatus."

" This invention relates to improvements in apparatus arranged " in combination with screw propellers, in order to obtain addi-" tional propelling power from the water as it is driven away or " set in motion by the action of the blades of the screw pro-" peller." The " improvements consist in mounting a series of " blades or vanes behind the screw propeller, upon which the " water driven aft by the screw impinges, and acts so as to impart " rotary motion to such blades or vanes. The power thus " obtained by the action of the water driven backwards from " the screw propeller in an angular direction from the line of " the screw shaft or axis, is transmitted from the boss or axis " of the blades or vanes by means of toothed wheels or other " suitable gearing to the screw propeller shaft, so as to aid in " propelling the vessel."

The second part of the improvements " consists in forming the " forward edges of the blades or vanes of corresponding contour " to the contour of the back of the blades of the screw propeller, " so that the back of the screw may revolve in close contact with " the edges of the blades or vanes, in order that the water may " act upon the face of the vanes at the same time as it is driven " by the blades of the screw propeller."

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 24.—N° 1138.

DART, Richard Henry.—(*Provisional protection only.*)—" Im-" provements in paddle wheel propellers adapted for propelling " vessels in water."

" The object of this invention is to enable the paddles to maintain " a perpendicular position in their passage through the water, thus " obtaining a backward or forward pressure without elevating or " depressing the water. The parts are, first, a pan of circular " sides, with equidistant perforations just within their circum-" ference to receive the axles by which the paddles are suspended; " 2nd, a ring of the same circumference as the sides, and per-" forated to correspond with the sides; 3rd, each paddle is formed " of two parts connected at their lower edge by an axle; 4th, " each paddle has an axle projecting from each of its upper outer " corners. The sides being fixed on a shaft as usual in paddle "wheels, the paddles are suspended by their upper axles from "and between the sides. The ring is suspended from the paddles "by passing the lower axles through the perforations in the ring, "by which means the perpendicular suspending weight of the "paddles is combined."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 1.—N° 1212.

RANKIN, Daniel.—(*Provisional protection only.*)—"Improvements in marine steam engines."

"This invention relates to a peculiar arrangement of the parts "of marine steam engines, such arrangement having a greater "compactness combined with accessibility and convenience, than "has hitherto been obtained with a given size of cylinder.

"The improved arrangement comprises one or more oscillating "cylinders, and each piston is fitted with two piston rods in a "plane at right angles to the crank shaft. A cross head is fixed "on the two piston rods, and on the side next the cylinder this "cross head is formed to receive bearing brasses and a cover for "connecting it upon the crank pin. With this arrangement the "cylinder can be placed so nearly to the crank shaft, that the "crank pin will have only the thickness of the bearing brass "with its cover, and a slight clearance in addition between it and "the cylinder cover, whilst the stuffing boxes for the piston rods "can without inconvenience be made of the extra length well "known to be desirable with oscillating cylinders."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 1.—N° 1215.

RUTHVEN, Morris West.—"Improvements in propelling "vessels."

The invention "is applicable to the propelling of vessels "wherein water is constantly pumped by one or more rotating "or centrifugal pumps to outlets or passages on either side of "a vessel." On each side are two passages, one opening towards the stem, and one towards the stern, "and where the two are connected to a common supply pipe from the rotating or centrifugal "pump or pumps, there is applied a rotating sluice," either cylindrical or conical. "This rotating sluice is closed at both "ends, and it is also closed at one side to such an extent that "when the closed side is turned opposite either of the tubular "passages, the way through that passage will be closed." The [illegible] so as to allow the water to pass to either [illegible] either stern or stern way."

[illegible]

A.D. 1865, May 3.—N° 1234.

[illegible] THORNTON, and FYFE, JOHN BROUGH.—[illegible] apparatus for receiving the thrust of screw [illegible] other revolving shafts."

[illegible] formed with a boss, which has "end faces truly at [illegible] angles to the shaft." Annular discs are fixed to the end [illegible] surfaces to receive the thrust are "upon similar [illegible] formed with a shallow annular groove. The fixed discs [illegible] so as to receive between them the boss with its discs [illegible] sets of balls, between which sets the boss of the shaft [illegible] The whole is preferably made of steel.

[illegible] Drawing.]

A.D. 1865, May 4.—N° 1253.

[illegible] THOMAS.—(*Provisional protection only.*)—"Improvements in or applicable to marine condensing steam engines."

[illegible] invention consists in condensing the steam by injecting [illegible] water, or water previously used, and in refrigerating or [illegible] the water used for this purpose over and over again." [illegible] water passes from the hot well of the condenser to a refrigerating apparatus, and thence back to the condenser. This [illegible] apparatus is formed "of a series of thin plates [illegible] with spaces between them, and jointed and secured together to form two distinct continuous zig-zag passages, one [illegible] the hot, the other for cold sea or other water," "the hot [illegible] cold water passing in opposite directions, being merely separated by the thin plates." The cold water is driven through the refrigerator by a pump. Any other refrigerator [illegible] used for the same purposes.

[illegible] No Drawings.]

A.D. 1865, May 9.—N° 1288.

[illegible] CHARLES STUART.—(*A communication from Matthew* [illegible] *Crooker.*)—"Improvements in paddle wheels."

[illegible] invention consists in arranging the buckets or floats [illegible] in an arc larger than true circles struck from the axis [illegible]

" shaft. The said buckets or float boards are thereby caused to " pass through the water at different depths or degrees of immer- " sion, beginning at that one having the least dip, and gradually " increasing to that one having the greatest dip, and then " receding back in like order. In the case of single engines " being used, that arc of the wheel whereon the buckets or float " boards have the least depth, will be in the water when the " engine is at 'the dead points,' and that arc whereon the " buckets or float boards have the greatest depth will be im- " mersed when the engine is exercising its greatest power, or is " at half stroke. In the case of double engines, the order of " arangement is different, for as the power then approaches more " nearly a constant force, the wheel in that case is divided into " sections, so that while a series of buckets are entering the water " successively deepening their immersion, another set will be " entering successively diminishing the degree of immersion.

"By this means the force of the shocks is reduced to a minimum, " while the power of the wheel is equalized."

[Printed, 6*d.* Drawing.]

A.D. 1865, May 10.—N° 1303.

POKUTYNSKI, Stanislas, and **MYCIELSKI**, Michel.—" Improvements in the mode of and apparatus for obtaining " and applying motive power."

The object of the invention is "to obtain increased power from " the pistons of steam engines, whether horizontal or vertical, " fixed or moveable, marine or otherwise; and at the same time " reduce the dimensions of the cylinders in which they work, and " by this means economising both steam and fuel." The piston rod is so constructed as "to be capable of extension and con- " traction; this is effected by connecting it with several pieces " hinge-jointed together; in short, having the exact form and " construction of the well-known instruments called lazy-tongs, " the effect being to obtain a stroke twice or three times the " length of the piston, by which means a longer lever can be " employed. The lever is attached in the usual manner to the " driving wheel; the other free end is connected with the jointed " piston rod above mentioned, so that when the jointed rods are " fully extended at the full stroke, on making the return they " gradually contract."

[Printed, 8d. Drawing.]

A.D. 1865, May 30.—N° 1481.

JOPLING, JONATHAN.—"Improvements in apparatus for "propelling and steering vessels."

"This apparatus consists of a hollow vertical shaft, on which "is fixed a circular case, open in the centre to allow the water to "enter, and also open for about one-third more or less of its "circumference to allow the water to pass freely out. Inside the "hollow shaft rotates another vertical shaft, on which is fixed "a fan or fanner wheel having 2, 3, or more arms, fans, or blades "which, when in motion, cause the water to pass freely out of "of the case. For turning the vessel, or going astern, or altering "the direction of the vessel's motion, this will be accomplished "by causing the hollow shaft with the case to revolve or turn "until the opening in its circumference allows the water to escape "in the direction desired; it will thus not be necessary to reverse "the engines, nor is any other rudder required. The apparatus "may be fixed near the stern post, and the shafts pass up "where the rudder trunk usually is. The fan wheel shaft may "be driven from above or below the circular case, as may be "desired."

[Printed, 10*d*. Drawing.]

A.D. 1865, June 5.—N° 1538.

ROBERTSON, JOHN.—"Improvements in the machinery or "apparatus for actuating the slide valves of marine engines, and "in the slide valves thereof."

"One modification of this invention consists in doing away "with the ordinary side valve altogether, and substituting in lieu "of it two or more valves driven by means of a cam on the "driving or other shaft; in this cam an oblique groove is cut "along part of its circumference, into which groove the end of "a rod passes, and as the cam revolves, it by means of the "oblique groove imparts to the rod an alternate backward and "forward movement, which motion is communicated by means "of tappets" to sliding plates. "The exhaust valve is in this "modification similar to the sliding valve, and is actuated by "similar mechanism; the exhaust valves may be situated in "the same chamber as the admission valves, or they may be "placed in separate chambers.

"Under another modification of this invention, at each end of "the ordinary slide valve transverse openings are made; in these "openings a sliding plate is fitted to move steam-tight. The

" use of the sliding plates is, that when the main slide valve has " arrived at the end of its travel, and the steam port is fully " open, the sliding plate at that end of the valve, when the port " is wide open is immediately passed across the opening, then " over the port; the port thus being very rapidly closed, the " admission of steam to the cylinder is at once cut off, and that " already in the cylinder completes the stroke by expanding. " This arrangement of valves ensures a much more speedy cut " off than can be effected by the ordinary slide valve alone, " driven as usual by eccentrics. The motion necessary for " effecting the rapid movement of the sliding plates is effected " by means of a cam on the driving or other shaft, as in the first " modification."

[Printed, 10*d.* Drawing.]

A.D. 1865, June 10.—N° 1583.

SPINK, DANIEL.—(*Provisional protection only.*)—" Improvements in propelling vessels."

A system of pipes or channels is arranged radiating from a centre to the external water, two pipes being carried astern and two forward, while another leads to the steam pipe. The forward pair are used for going astern, the stern pair for going ahead. Each pair may be cut off as required from the steam pipe. Steam is admitted to either pair; meets the water outside, is condensed, and the pipe fills with water, which is prevented from entering the steam pipe by a valve. Steam is again admitted and drives out the water. This propels the vessel.

[Printed, 6*d.* Drawing.]

A.D. 1865, June 19.—N° 1645.

HOOK, CHARLES, and PEACE, ALFRED.—(*Provisional protection only.*)—" Improvements in propellers for ships and other " vessels."

The " invention consists in forming a propeller to be attached " to the main shaft of ships and vessels driven by steam or otherwise, by which " is saved or diminished " the power lost by " backwater in the ordinary paddle wheel." To effect this, on both sides of the ship or vessel shaft is placed a crank to which is attached " a bar or connecting rod, the opposite end of which bar " or rod works in guides; to the under side of this bar or connecting rod " is affixed " a number of blades which enter and leave " *the water vertically.* In case of accident to the motive power,

" or when the vessel is under canvass, by placing such cranks " and connecting rod or bar in a line horizontal with the centre " of the main shaft the blades will be clear of the water, thus " avoiding the loss of power or drag on the ordinary paddle " wheels."

[Printed, 6*d.* Drawing.]

A.D. 1865, June 29.—N° 1731.

COX, JOHN.—" Improvements in oars, paddles, rowlocks, seats " and fittings for boats."

The only part of these improvements having reference to the present series, is thus described by the inventor :—

"My improvements in oars, paddles, and rowlocks consist in " adapting the oars or paddles to the rowlocks, so that the oars " or paddles are free to move vertically and horizontally; they " are thus kept in proper position for propulsion, dipping and " lifting the oar or paddle into or out of the water is rendered " quite easy, and the blade or blades cannot screw round edgeways to the line of motion. I prefer to place the rowlock in a " tubular socket, so that it is free to rotate horizontally, while I " insert an axle through the oar or paddle, which axle is prolonged " horizontally through the top part of the rowlock, thereby " allowing the oar or paddle to vibrate vertically. The axle of " the oar or paddle is placed at right angles to the propelling side " thereof; the horizontal motion is due to the rowlock, and the " vertical motion to the axle passed through the oar and rowlock. In propelling a boat or canoe with a double-bladed " paddle I place the tubular socket in the central longitudinal " line of the boat, at a proper and convenient distance from " the bow; the socket should reach high enough to allow free " motion to the oar over the sides of the boat."

[Printed, 8*d.* Drawing.]

A.D. 1865, July 1.—N° 1752.

CALVERT, JOHN.—" Improvements in apparatus for propelling " ships and other vessels."

The invention " relates to certain improvements in the construction and arrangement of apparatus for the purposes of propulsion, and whereby great propelling power is obtained with the " expenditure of a comparatively small amount of force. Two " *cylinders* or tubes are constructed or placed in the ship or

" vessel, the same being situated within the hull, and running " from stem to stern below the water-line. The said cylinders or " tubes are open at both ends, and in the interior of each is placed " an archimedean screw mounted on a suitable shaft. The shafts " are caused to revolve by means of gearing actuated by any of " the ordinary and known machinery applicable to the purpose. " The cylinders or tubes being open at both ends, as before mentioned, the revolution of the screws causes a continual stream " of water to be drawn into the same at the forward ends thereof. " The water thus enters the cylinders or tubes at those parts of " the ship or vessel at which there is the greatest pressure from " the surrounding water, while it is ejected by the action of the " screws, so as not only to obtain the requisite direct propulsive " power, but also to compensate for the retarding influence occasioned by the displacement of the water by the forward " motion of the vessel, great additional speed being thereby " gained. The arrangements before described are perfectly under " control, as the screws can be operated either together or singly, " and can also be reversed as may be desired, and so that the " ship or vessel can be steered as well as propelled by means " thereof."

[Printed, 4*d.* No Drawings.]

A.D. 1865, July 10.—N° 1820.

LYTTLE, William Alexander. — "Improvements in the " means and apparatus for increasing the mechanical power of " steam."

The furnace is fed with air by a force pump, and there is no vent for the products of combustion except " through the working " cylinders or ports at which the pressure of the steam is converted into motive power." The fire chamber is fitted with ports or valves which admit the air "through, underneath, or " round the boiler" as usual when open, but when closed render the furnace air-tight. A valve communicates "between the furnace " and the steam." The heated gases blend with the steam and heat it. When a fresh supply of coal is added, the air-ports are opened, and the products of combustion pass off in the usual manner. In marine engines, the chimney may be placed over the furnace end of the boiler.

[Printed, 1*s.* Drawing.]

A.D. 1865, July 20.—N° 1890.

SIMPSON, Cortland Henry.—" Improvements in apparatus " for propelling vessels."

A hollow drum revolves within a casing. It is mounted on an axis, and driven like a paddle-wheel. It " is furnished with a " number of casings disposed radially and open at the circum- " ference only. In these casings, which each extend to nearly " the length of the cylinder, are fitted pallets or float boards " by which the propulsion is effected; these pallets slide in a " radial direction, and are capable of projection beyond the " periphery of the cylinder to an extent to offer the requisite " amount of surface to the water for propelling; they also slide " within the limits of the hollow cylinder or drum. The position " of the pallets is controlled and regulated by pins or studs with " truck rollers projecting from each end of the floats or pallets. " The pins or studs may be mounted at a point furthest from the " centre of the wheel. The truck rollers travel in cam grooves, so " arranged as to project and withdraw the pallets during the " proper periods in the revolution of pallet drum or wheel. The " case enclosing the pallet wheel has an arc or section, removed at " the part where the pallets are projected from the wheel; this " opening in the case may either be united with a channel passing " through the body of the ship, or it may be united with the " sides or bottom of the ship, and so that the pallets when so " projected pass into and operate in the external water;" in either case the pallet wheel is disposed " by preference below the " level of the external water. When this propeller is worked in " connection with internal chambers, the latter may open to the " bow at the one end and to the stern or run of the ship at the " other end; or they may open otherwise to the external water, " but by preference at the lowest convenient points. This wheel " being hollow, and wholly or almost wholly below the water " level, will by its buoyancy relieve the bearings of weight and " friction. The pallets themselves may, if of metal, be hollow " and of less specific gravity than water, which will conduce to " great freedom of working and moving in and out of their " recesses during the revolution of the wheel as before described. " The case containing this pallet wheel or cylinder is of course " water-tight, and the axis bearings fitted with stuffing boxes or

" otherwise furnished to prevent the passage of water at the " bearings."

[Printed, 2*s.* 10*d.* Drawings.]

A.D. 1865, July 21.—N° 1899.

DAY, Saint John Vincent.—(*A communication from Thomas Craig.*)—" Improvements in the propulsion of ships, and in the " machinery or apparatus connected therewith."

The invention " which has for its object the propulsion of ships " through the water with a less waste of power than results from " the ordinary mode of propulsion either by paddles or a screw, " consists mainly of two wheels or drums which are set parallel " to each other, and are caused to revolve in the same direction " by the same or separate pairs or sets of engines. Passing over " the drums is an endless chain or chains or a belt, which may " be made of metal or other suitable material, on the outer " surface of which a series of propelling or float boards are " fixed; as the engines revolve the drum, the belt is caused to " travel, and its lower side with the propelling boards being " immersed in the water, the vessel is by their motion sent on its " course. This apparatus may be applied on both sides of the " ship proper, or it may be placed in the stern.

" The advantages resulting from this invention are, that the " surface of the propelling or float boards is maintained perpen- " dicular to the direction of the water for nearly the whole period " of its immersion and there is little or no loss from backwater."

[Printed, 10*d.* Drawing.]

A.D. 1865, August 9.—N° 2062. (* *)

CARTWRIGHT, Henry. — This invention relates to direct-acting marine and stationary steam engines, and consists, in so arranging the parts which transmit motion from the piston rod to the crank shaft, that the height of the engine is reduced, and room afforded for a longer stroke. A pair of engines with upright cylinders are illustrated and described. The cylinders are disposed on a bed plate beneath a top frame, which is supported on columns. The top of the piston rod of each cylinder carries a horizontal cross beam, the ends of which are fixed to vertical side guide rods, which pass down at the side through the top flange of the cylinder and cover, and are attached to blocks which slide in vertical guides attached to the cylinder sides. The lower ends of the connecting rods are jointed to these sliding blocks; the upper ends are coupled to a stay rod, carried by crank arms fixed on the ends of intermediate shafts rectilineally disposed on the top framing in suitable plummer block bearings. These shafts carry toothed wheels, which gear into similar wheels fixed on a counter-shaft which extends beyond the whole length of the frame, whereby the reciprocations of the pistons, one of which follows the other at an interval of 90°, are timely maintained. The modification of an engine with side levers is shown.

In applying the invention to the engine of a screw propeller, the screw shaft is made "straight from end to end with toothed wheels "thereon." These wheels engage with other wheels in the crank and intermediate shafts. These shafts turn in bearings parallel to the screw shaft, and at a sufficient distance to enable the crank arms to clear it. The cylinders are above these shafts and the piston rods work through either the tops or the bottoms of the cylinders. In the latter case, corresponding alterations have to be made in the position of the connecting rods, etc.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1865, August 11.—N° 2080.

COLE, William Thomas, SWIFT, Henry Spink, and SOARES, Augusto.—"Improvements in apparatus for obtaining and applying motive power to various useful purposes."

Amongst the uses of the invention, the propulsion of ships is mentioned.

A hollow shaft communicates with a boiler. A second hollow shaft is continued to the fly wheel from the first, round which it is capable of revolving. "The spokes and periphery of the "fly wheel may be made hollow, or supplementary radial tubes "may be fixed to the wheels, such spokes or tubes being in continuation with the shaft in order that the steam may traverse "them. The spokes, tubes, or periphery of the fly wheel are "terminated by tubular outlets set at right angles to the radii of "the wheel. Each of these openings or outlets is provided with "a throttle valve, consisting of iron plates and india-rubber, in "order to throttle the exhaust ports and decrease the area of the "escape of steam. These valves are controlled by means of a "hand lever in connection with a sliding ring on the shaft, such "*ring pushing* (nearer to or further from the fly wheel), a second

" sliding ring held by clutches so as to turn with the shaft. The " latter ring is connected to toggled arms joined to the valves; " it therefore follows that as the ring is moved the toggled joints " will compress or open the valves as required. The fly wheel " is to be enclosed in a cylindrical steam-tight chamber, in con- " nection with a condenser or steam pipe, and the steam shaft " and driving shaft are to pass through the chamber by means " of stuffing boxes. The steam issuing from the periphery of " the fly wheel, or from the tubes, causes a reaction upon the " interior thereof and thus a direct rotary motion is effected from " the fly wheel itself, thus expending the power at the greatest " leverage or furthest from the centre of the shaft, which is the " centre of motion."

[Printed, 8*d.* Drawing.]

A.D. 1865, August 18.—N° 2130. (* *)

STEVENSON, James.—(*A communication from Giovanni Batista Venzano.*)—This invention relates to a rotatory steam engine, whence "rotary motion is at once obtained by the direct impact " and continued pressure of steam upon the periphery of a cylin- " der or wheel" suitably furnished to receive it. Two wheels on the same axis side by side are employed, or a double wheel, the buckets or cells on one side or section being arranged at suitable " angles for forward motion when struck with the impulsive force of the steam, and those on the other section for the reverse. On the periphery of each wheel or section a steam-tight chest is placed, so as to be in steam-tight frictional contact and cover a certain number of the buckets as the wheel revolves; grooves are formed round the wheel into which suitable metallic packings attached to the steam chest are fitted to slide. After the steam has operated it is, in some cases, directed into converging tubes, which form a connection between the buckets at the periphery and the axis of the wheel, which is hollow and forms a passage for the steam to the pipe which leads to the condenser or to the atmosphere. The drawing exhibits the invention applied as a marine engine for driving a screw propeller by means of the intervention of a large spur wheel mounted on the main axis, and geared into a pinion which is fixed upon the propeller shaft.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1865, August 29.—N° 2223.

CLARK, William.—(*A communication from Ambroise Raphin.*) —" Improvements in apparatus for propelling vessels."

Discs revolve with their lower sides immersed in the water at the side of, or below the hull of the vessel. Rods are jointed to these discs in such a way that they are always kept in a horizontal position when carried round by the discs. These rods are furnished with pallets or floats. As the discs revolve, each rod in succession is depressed, drawn through the water, and again raised.

[Printed, 1*s.* Drawings.]

A.D. 1865, September 1.—N° 2258.

DAVIES, Richard.—(*Provisional protection only.*)—" Improve-" ments in propellers for ships and boats."

The " invention relates to a new mode of propelling vessels, " the propelling power being produced by means of a force pump, " attached to the bottom of the vessel, or at any other position " more convenient. The pump is made square at the bottom or " under part, and it is there fitted with a square valve which is " actuated by a lever and connecting rod in such manner that " whilst one side of the valve box is open, the other is shut, and " vice versâ. The sectional area of the opening of the valve box " is much less than the sectional area of the plunger of the " pump.

" The action of the apparatus is as follows :—Supposing the " plunger is drawn and the valve closed on the left hand side, " the plunger in its upward motion sucks water into the pump. " If now the valve be reversed and the right hand side of the valve " be closed, and the left be opened, the plunger in going down " presses or forces the water within the pump outwards with a " certain pressure against the water surrounding the vessel which " will return the pressure in exactly the same degree, and cause " the vessel to move.

" This propelling arrangement may be placed in the vessel " vertically, horizontally, or at any other angle.

" The vertical propeller can be so arranged that water may be " sucked in through the same opening that it is forced out ; in " this case the valve is dispensed with. The pumps may be made " either double or single acting."

[*Printed, 4d.* No Drawings.]

A.D. 1865, September 1.—N° 2260. (* *)

LAKE, John.—This invention relates to multitubular boilers especially applicable for agricultural and other locomotive, and marine steam engines. Letters Patent bearing date February 7, 1865, No. 345, were previously obtained by the inventor for the application of the invention to the stationary boilers of fixed engines. In the smoke chamber opposite the rear end of each tube or flue way, the point of a coniformed fluted plug or valve is disposed in position for entering, for the purpose of holding in check, the heat and the flaming gases, so as to prevent their too rapid passage through the flue tubes. These pointed plugs are fluted from the base to the end, so that minute draught ways are always left open; they are fitted to frames which cover sectional areas of the entrances to the tubes, and by means of suitable mechanical arrangements, operated by the attendant, are advanced to the tubes separately, sectionally, or collectively. It is stated that the object of the invention is not new, it having previously been sought to be obtained by the use of dampers and other imperfect contrivances.

[Printed, 10*d*. Drawing.]

A.D. 1865, September 6.—N° 2291. (* *)

GREEN, Edward, and GREEN, Edward, the younger.—"Improvements in boilers and furnaces, and in cleansing the "flues thereof."

An upright boiler "is composed of circular rings," at the bottom, around the outside of which are other rings forming an annular space for the fire-place." The fuel is fed into this space from the top. "A boiler may also be formed of vertical "pipes placed side by side and communicating at top and bottom "with hollow rings."

For marine boilers "horizontal hollow rings" are used "in the "uptake, with connecting elbows between" them. The rings "may form part of the boiler," or "be used for heating the feed "water or steam." For producing a circulation of the water, a chamber is placed at the top of the rings, and the boiler is set at an incline from the grate.

Furnaces are built with a cylindrical revolving grate, placed transversely and at the furnace mouth, over which is a hopper for supplying the fuel. At the back, and with its axis on a lower level than that of the revolving cylindrical grate, is fitted another but smaller "cylindrical grate;" or "an ordinary "grate fixed upon a hinge" is used. "Instead of a transverse "cylindrical grate," "longitudinal cylindrical grates" are sometimes employed "inside the fire-place in the form of barrels," "cast "hollow with perforations for the admission of air, which like "the others may revolve." The "grate bars" are placed "transversely in the fire-place, of a vandyked form, both at the top "and the bottom."

The soot is removed by compressed air, superheated or other steam, "which is forced in minute jets against the sides of the "heating vessels." "A steam cylinder with a piston," "to the "end of which is attached an air ram working into a barrel," "is in communication with an accumulator or air vessel." In some cases there may be adapted, "a frame made of a number of "hollow perforated rings encircling the pipe attached to cross "connecting pipes, to which is attached an upright pipe, to the "top of which is fixed a piston working in a cylinder. When the "compressed air is turned on to the cylinder, the framework of "perforated rings is raised on to the top of the apparatus, at the "same time the air is admitted through the opening into the "upright pipe communicating with all the others."

The tubes are cleaned by means of "a central air pipe placed "in each tube."

[Printed, 1s. 4d. Drawings.]

A.D. 1865, September 18.—N° 2374.

SEDLEY, Angelo James.—(*Provisional protection only.*)— "Improvements in paddle wheel propellers."

In constructing a wheel, a hollow drum is first made, preferably of the following dimensions:—"Diameter, 12 feet; width over "centre of diameters, 5 feet; width over outer circumference, "4 feet 6 inches, thus tapering the sides of the drum from the "centre of the diameter to the outer circumference; this drum "is keyed air-tight on to a shaft, such as is ordinarily used in "paddle steamboats, through the centre of the diameters of the "of the drum wheel. The paddle floats are attached to the "ordinary framing which is used in the construction of feathering "floats, and do not touch the drum wheel on the outer circumference, there being an intermediate space of more than a "*quarter of* an inch between the float and the drum. The drum

" wheels may be used singly or in pairs, or two or more pairs " may be used, placed one behind the other on the side of a " vessel to propel it, and may be driven by separate engines, or " the drum wheels may be connected to the main shaft by connecting rods as is usual in locomotive engines."

Where more than one drum wheel is used on one side of a vessel, the hinder drum wheel should have a less diameter than the one in front, but a "larger float or paddle area in the pro- " proportion of one-fifth. Fixed paddles or floats or feathering " floats may be affixed to the outer circumference of the drum or " to the sides of it."

[Printed, 4d. No Drawings.]

A.D. 1865, September 18.—N° 2380.

KEENE, George Augustus. — "An improved feathering " paddle wheel."

The floats instead of being fixed to the circumference of the wheel, are attached in pairs, one at each end of a rod. This rod passes diametrically through the wheel and is capable of revolution. Each paddle is attached to the rod so as to have more of its surface on one side of the rod than the other. The greater heaviness of one side makes the paddle turn over sideways on leaving the water. This causes the paddle on the other end of the rod which is in the air to turn also, into such a position that it will enter the water a little sideways or "feathered." The angle at which the paddles are set to one another may vary. It is generally about 45°.

[Printed 8d. Drawing.]

A.D. 1865, September 22.—N° 2418.

ATKIN, Robert.—"Improvements in propelling vessels."

The inventor applies "to the sides of the vessels (at that part " where paddle wheels are usually placed) screw propellers, " which are set in bearings in frames hinged or jointed to the " sides of the vessel, and capable of being raised or lowered from " the bulwarks by means of lifting or suspending chains worked " by a windlass or other equivalent gear. The frames are also " held by supporting chains from the bulwarks, the lifting chains " being hung from the davits. The frames contain screws or

" propellers driven by endless chains, and whelped bosses on the " shafts; or the shafts may be actuated by toothed gearing, in " either case worked by steam power, the chains or shafts " passing through the sides of the vessel. One or more screws " may be placed on each side of the vessel, and by reversing the " engine on one side and going ahead on the other, the vessel " may be turned round in a space little more than her own " length. By placing the propellers amidships and on each side " of the vessel, the vibration incident to the use of the screw " propeller is reduced very considerably, and an economy of space " will be effected. When the wind is fair, the propellers may be " raised from the water, and the use of the steam power be " discontinued."

[Printed, 8*d*. Drawing.]

A.D. 1865, September 23.—N° 2434.

RANKINE, WILLIAM JOHN MACQUORN.—(*Provisional protection only.*)—" Improvements in feathering paddles and oars."

The inventor thus describes his invention. "The nature of " my invention is that I dispense with all mechanism for causing " paddle floats to feather, by making them of such shapes that " they tend of themselves to move broadside forward when " driven through the water, and edgewise in coming out of the " water. For that purpose I make the axis about which the " float turns in feathering, pass as accurately as possible through " the centre of figure of the float and through the centre of its " thickness. I make the float as thick in the middle as may be " required for strength, and I prefer to make it thin and sharp at " the edges, but if necessary it may be made of uniform thickness; " one half of the float may, if desired, be loaded, so as to make " the edge of that half tend to hang downwards, or nearly so, " provided such loading does not interfere with the symmetry of " figure of the float about its axis, but such loading is not " essential to the making of the float tend to move broadside " through the water and edgewise in coming out of the water. " I apply my aforesaid invention to oars, by making the blade of " the oar so as to turn freely about a longitudinal or nearly a " longitudinal axis which traverses the centre of the figure of " the blade at the middle of its thickness."

[Printed, 4*d*. No Drawings.]

A.D. 1865, September 27.—N° 2481.

McCOMB, JAMES JENNINGS.—(*A communication from Ephraim Chidester McComb.*)—"Upon the wheel shaft are firmly keyed "three or more hubs provided with radial arms for receiving the "floats. These arms set out of line with each other in the "direction of the wheels' axis, the object being that their ends "shall correspond with a line drawn at or about an angle of 45° "with the axis. This line of the arm forms an acute angle with "the side of the boat facing the bow and an obtuse angle at the "opposite or rear side. The inner edges of the inside arms, "that portion where the floats must find a bearing, are slanted "or brought to the proper bevil angle of about 45°, and the "outside edges of the corresponding outside arms are also slanted "or brought to the aforesaid proper bevil angle with a gradual "tapering or falling off to the ends of the arms. The ends of "the arms should not project beyond the lower edge of the float, "but be cut tapering from them. The centre arms have such a "bevil and taper on their outside edges as will afford the desired "bearing for the floats in their central position. The floats are "laid through the entire breadth of the wheel at or about an "angle of 45° acute to the side of the boat facing the bow, and "correspondingly obtuse at the reverse side; and they are "secured so that their upper edges will be equidistant from "the axis of the wheel, or parallel with the surface of the water, "and in a straight or right line. At their outer ends the floats "are about one-fifth wider than at their inner ends, the inner "edges being convex or crowned, increasing to the outside end. "The ends of the floats are convex, decreasing from the outer to "the inner edge. These floats when affixed to the arms will "present an oblique concavity running from the outer edge on "the inside to the inner edge of the outside, and a slight general "longitudinal convexity, and the floats will project well beyond "the arms. The peculiar twist or curves belonging to this float, "after the prescribed form and shape have been attained, must "be produced before the floats are affixed to the arms, whether "the same be made of wood or iron.

"It will follow as a matter of course that the outside arms are "so much longer than the inside arms, as the floats are wider at "that point than at the inside. This long angle gathers the "water, and concentration takes place at the outer ends, and the "retarding elements of percussion and lift, so conspicuous in "the wheel in general use, are absent in this wheel, and in their "stead the floats act as propellers both when entering and "leaving the water."

[Printed, 1s. No Drawings.]

A.D. 1865, September 28.—Nº 2493.

SPINK, Daniel.—(*Provisional protection only.*)—"Improvements in propelling vessels and ships, and in apparatus for the "same."

The "improvements consist in the application of the pressure "which a column of steam exerts when escaping either into the "atmosphere or a condenser, the direction of which force is "opposite to that of the escaping steam. One, two, or more "valves are employed, which may be worked by a small separate "engine, or by any other suitable means, and which are placed "in the pipe or pipes or channels through which the steam "passes, so arranged that one valve is opened while the other is "closed." "The amount of steam allowed to escape being only "equal to the amount the space between the two valves will "contain, and one valve being opened during the interval of time "required to fill the space between the valves, the unbalanced "pressure at the opposite and fore end will exert a force to propel "the vessel or carriage in the direction required. The steam "which is allowed to escape may either do so into the atmosphere "or into a condenser disposed in the rear of the boiler (for propelling ahead) in which it is to be condensed in the ordinary "manner, and the vacuum maintained by an air pump driven by "the small engine used to operate the valves."

[Printed 6d. Drawing.]

A.D. 1865, October 5.—Nº 2563.

FRASER, Robert William.—"Improvements in the propelling and steering of steam ships or other vessels, and in the "machinery or apparatus employed therefor."

One or more flat plates are arranged to a cross-head "attached "by a reciprocating driving shaft (passing out through a stuffing "box by preference in the stern of the vessel) to the piston rod "of the motive power engine." This plate is driven outwards for the propelling stroke, and feathered for the return stroke. The feathering is accomplished by rods attached to the propeller.

The rods may either pass through the shaft, or be distinct from from it. Two methods are described for directing the propellers so as to steer the vessel. The first is thus described :—The inner end of the feathering rod at the end of the stroke strikes against a stop. Its motion is checked, and "consequently it either " pushes up to a vertical, or pulls down to a horizontal position, " the propeller to which it is hinged." A friction clutch may be brought down on the rod, so as to hold it in a horizontal position. By its aid the rod may be made to keep the propeller vertical during the return stroke, and so back the vessel. In the second method, the cylinder has three pistons; "the two additional " pistons are attached to each other at an invariable distance by " two rods which pass through the main or driving piston. One " or other of these pistons must always be from the main piston " a distance equal exactly to the space moved over by the crank " attached to the propeller." The "rods uniting the pistons " pass through stuffing boxes on the lid and are attached to a " cross-head, and thence pass to cranks which they drive." The action of the apparatus is thus explained.

"Let it be supposed that an outward stroke has been made " with the propeller in a vertical position; at the termination of " this stroke the lowest piston, with the feathering rod attached " to it, is at the end of the cylinder, and the steam is admitted " beneath the lowest piston; it immediately moves through the " space between it and the main piston, pulling down the pro" peller to a horizontal position, and as soon as it touches the " main piston it drives it to the other end of the cylinder; this " stroke being completed, the upper piston arrives at the opposite " end of the cylinder, having a similar space between it and the " main piston; on the admission of steam as before, it moves " forward and pushes up the propeller, and then drives the main " piston to the other end for the propelling stroke; the opposite " action for backing or steering is obtained by a simple reversing " mechanical contrivance, and to obviate any concussion when " the pistons come in contact in the cylinder, there are valves in " each of the two additional pistons which admit a small portion " of steam between their surfaces."

[Printed, 1s. Drawing.]

A.D. 1865, October 7.—N° 2587. (* *)

HOWARD, JOHN.—(*A communication from Matthew Murray Jackson.*)—(*Provisional protection only.*)—"This invention relates

“ to a novel arrangement of compound cylinder engine whereby the steam expande in one cylinder can be passed directly to the second and larger cylinder, where it will act at a reduced pressure. Hitherto it has been thought necessary to provide a vessel or receiver, in which the steam from the small cylinder might be stored ready for use in the larger cylinder. Experiment, however, has proved that this is unnecessary, as by arranging the slide valves so that the one which commands the steam passages of the smaller cylinder shall have a larger lap than the slide valve of the larger cylinder, a port of the larger cylinder will always be open when steam is passing from the first cylinder to receive that steam and conduct it to the piston of the larger cylinder. The steam having acted upon this cylinder is allowed to escape into a condenser; the cranks with which the piston rods are connected are set at right angles to each other and balanced, the pistons will not, therefore, as has been customary in compound cylinder engines, complete their traverse together, but their action will be similar to those of independent engines connected to the same driving shaft. Thus one pair of cylinders arranged according to this invention for marine purposes will serve the purpose of a pair of engines, thereby effecting a great economy both in construction and of engine space.”

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 9.—N° 2600.

GEDGE, WILLIAM EDWARD.—(*A communication from Abraham Désiré Cherfils.*)—“ Improved machinery or apparatus for obtaining motive power by expansion of air.”

The apparatus is composed of three cylinders “ in each of which moves a full piston having an optional measured stroke at the lower part of the combustion chamber.” Two cylinders only are mentioned in the Provisional Specification. Beneath the lower limit of the stroke of the full piston is a vacant space intended to fulfil the office of a sucking and force pump, in order to cool the inner and outer sides of the cylinder. The rod of the piston is directed in its movement by a slide bar, and is united by a connecting rod to the end of the cranks of the horizontal shaft, to which the piston will transmit motion. These cranks are 120 degrees from each other, so that there is no dead point. Against the outer surface of each cylinder is fixed a round metallic box, pierced in its two faces by two openings corresponding with two others pierced in the upper part of the cylinder, and in the combustion chamber, permitting the introduction into this latter of atmospheric air by one, and bi-carburetted hydrogen gas by the other. Inside each box moves a disc, exactly filling it, which obeys the motion transmitted to it by an eccentric fixed on the horizontal shaft at 20 degrees from the crank, the right hand one forward, and the left one at the back for each cylinder. This disc is also pierced with two openings corresponding exactly with those of the boxes and cylinders, so as to permit the introduction of the air and the gas, once only in each revolution. For this purpose each cylinder has two boxes, and the openings of these boxes communicate by tubes with the feed pipe. Each of these tubes is furnished with a cock attached to the same rod, and so arranged that the right cock is open when the left one is closed, and vice versa. The opening intended for the introduction of the gas is only a fifth of the size of that intended for the air; further, two compression or force pumps, the one for the gas the other for the air, permit the mixture to be exactly regulated. The disc further carries a third opening intended for the passage of the azote of the carbonic acid, and of the water, vapour, or steam produced after the combustion; it is of the same size and diameter and at the same distance from the centre as that intended for the passage of the air. In the upper part of the cylinder (combustion chamber) are fixed two small copper balls, each furnished with a point or needle brought within about half an inch of each other. One of these balls is in communication with the copper rod or wire carried by the small vector, car, or carrier fixed interiorly on each excentric, while the other ball communicates constantly with one of the knobs of a strong "Rhumkorff" bobbin or spindle; these two communications takes place identically for the right and left excentric of each cylinder. Above these two vectors, ears, or rod or wire carriers, fitted to each excentric of the cylinder, are placed two others carried by an arrangement similar to that which regulates the introduction of the mixture, and working at the same time by the aid of a bent lever which joins them. These two latter vectors each carry interiorly a copper rod or wire, which is in communication with the second knob of the "Rhumkorff" spindle above mentioned. They are so arranged as to cause the copper rod which they carry to communicate as exactly as possible once in each revolution with that of the *vectors* of the excentric, now on the right, now on the left, according to the movement which the apparatus has. The bobbin or spindle is set in activity by two strong elements of "Bunsen's," or more, so as to produce strong sparks in the combustion chamber each time that the excentric places the copper rods in contact with each other. Lastly, each cylinder is furnished with a pipe communicating with the gas feeding pipe, provided with a cock, so that for a change of motion gas may be introduced into the combustion chamber. A regulator acting on a cock closing the gas feeding or supply pipe permits a measurement of the quantity used. The apparatus is mentioned as being particularly applicable to steam vessels.

[Printed, 8*d*. Drawing.]

A.D. 1865, October 9.—N° 2601.

CLARK, William.—(*A communication from Cléanthe St. Coumbary.*)—" Improvements in apparatus for propelling vessels."

This " invention relates to improvements in apparatus for propelling vessels. The apparatus consists of two metal cylinders " fitted at the stern of the vessel, one on either side of the rudder " and below the water line. The dimensions of the cylinders " vary according to the size of the vessel, in which they are " placed in a horizontal position. At their front ends a leather " packing is adapted similar to those of hydraulic presses, in " order to prevent the escape of water; two hollow pistons are " fitted to slide tightly in the cylinders for the purpose of continually acting on the water entering therein. The rods of these " pistons are terminated by two other pistons driven by a double-acting high-pressure engine. Two discs are fitted water-tight " on the outside of the cylinders, which are operated from the " vessel, in order to close said cylinders when cleaning the " apparatus or when not in use."

" The advantages of this improved propeller over paddle wheels " or screws are, 1st, that increased speed may be attained; 2ndly " a saving in fuel effected; 3rdly, a saving in the cost of construction; 4thly, the apparatus occupies but very little room; " 5thly, is very simple and of great stability; 6thly, there is an " entire absence of resistance to steerage way; 7thly, the propelling apparatus, from its position, is completely protected " from injury by projectiles, or in case of running ashore, or from " icebergs."

[*Printed*, 1*s*. Drawings.]

A.D. 1865, October 13.—N° 2641.

ROSSELET, GEORGE.—(*Provisional protection only.*)—" A new " method of obtaining and applying water as a motive power for " propelling ships by means of paddle wheels inside and out- " side."

An aperture is formed in the vessel. A pipe conveys water from this aperture to buckets or floats on a hydraulic wheel. The wheel is either inside or outside the vessel. After driving the wheel the water is pumped out by a pump worked by the wheel. The wheel drives a screw or paddle wheels. A new method of attaching the paddles is shown. They are attached to trunnions mounted on the cross arms of the paddle wheel. The shaft of each trunnion has a tappet, which strikes against a fixed stop, so that the paddles are feathered on entering and leaving the water.

[Printed, 8d. Drawing.]

A.D. 1865, October 21.—N° 2729.

GIRARD, LOUIS DOMINIQUE.—" Obtaining sliding surfaces by " the interposition and circulation of a liquid or a gaseous fluid " between the frictional surfaces."

The bearing, as applied to " the plummer blocks or bearings of " the screw carrier " of a ship is thus described :—

" The concave surface of the sliding bearing contains only three " principal compartments, leaving wide ribs or entirely full flat " surfaces between them, which will easily serve to support the " axles in case of a deficiency of water." " The middle compart- " ment receives the water direct from the force pump ; the pres- " sure is greater in the middle than in the side compartments, " and should be so much greater on account of having to equi- " librate the side pressure whatever it may be. The water on its " way to the two adjoining compartments passes between the " surfaces of the shafts and the lower ribs ; but to assist the " raising at the commencement of the forcing back of the water, " a channel is made across the said ribs, which puts the two side " compartments in communication with the centre compartment, " but this communication takes place only on the rising of the " shafts or axles. The raising surface being thus increased, the " pressure of the water, which becomes equal in the three com-

" partments, serves to raise the shaft, and the carrying surfaces
" becoming to a certain extent raising surfaces, the water in the
" side compartments no longer requires to have the same pres-
" sure as that in the middle compartment, and this difference"
" serves to bring the shaft or axle back to its original position in
" case of side pressure."

[Printed, 2s. Drawings.]

A.D. 1865, October 31.—N° 2807.

NEWTON, William Edward.—(*A communication from James Buchanan Eads.*)—"Improvements in transmitting motion to "propelling shafts."

The invention "relates to a method of converting an alter-
" nating rectilinear motion into a rotary one without the use of
" a crank, and in such a manner as to avoid any dead points at
" the moment of reversing the rectilinear application of power."

The shaft is constructed with two or more sets of spiral grooves in it, turned in opposite directions, upon each of which sets a nut travels. The piston of the cylinder drives these nuts backwards and forwards over the shaft. One of the nuts is held from turning while the stroke is being made in one direction, while the other is permitted to move freely with the shaft. The shaft is thus caused to revolve. For the opposite stroke the action of the nuts is reversed. To reverse the action of the shaft, the action of the nuts is changed. The nuts are held on a frame actuated by pistons from steam cylinders. It has "a central " division, which will keep the nuts separate from each other." " The opposite faces of the central division of the frame" are made "to bear and bind against each other, or provided with " teeth surrounding the shaft and fitting into corresponding " teeth formed around the end of each nut next to this central " division." The frame being moved backward or forward, the nuts are held alternately. If the ends of the nuts are covered with material causing much friction, the teeth may be dispensed with. The ends of the frame may have teeth to be used for reversing the motion of the shaft. If the impetus of the shaft becomes greater "than that due to the movement of the nuts, " they will be thrown out of gear, and the shaft will rotate " freely."

[Printed, 1s. Drawing.]

A.D. 1865, November 15.—N° 2944.

GOODIER, JAMES, and KILSHAW, JOHN FOSTER.—"Improvements in apparatus for feathering the paddles of propellers "for navigable vessels."

The apparatus consists of a cam fastened to the ship's side, and encircling the main shaft, and levers, corresponding in number to that of the paddles, one end of each of which moves in a groove in the cam, while the other is connected to one of the paddles.

The levers travel round in the grooves, and "their ends are "fitted with studs and bowls to reduce friction." The groove directs the levers, so that they "draw the paddles or floats when "in the water alternately, and at intervals outwards from and "inwards towards itself," and so feather them.

The groove is formed three parts circular, and with its "lower "fourth having a lateral direction outwards gradually to its "greatest divergence," "and a corresponding direction back "again."

[Printed, 8*d*. Drawing.]

A.D. 1865, November 25.—N° 3031.

FERRIER, JOHN.—(*Provisional protection only.*)—"Improve-provements in the hulls and tackle of navigable vessels, and "in the gear for propelling the same by wind and steam or other "motive-power engine, and clearing the same from water, and "in apparatus connected therewith, to enable the said vessels to "be converted into floating graving docks or lifts for raising "vessels and other submerged or partially submerged heavy "bodies to or above the surface of the water."

The only part relating to marine propulsion is described as follows:—

"The third part of this invention consists in using twin screws, "on the shafts of which are fitted within the hollow sides of the "the vessel screws enclosed in a chamber, which has a passage "opening therefrom into the interior of the sides of the vessel, "and has also port openings extending through the vessel's "sides, which latter port openings are fitted with valves which "are capable of being opened and closed by hand, the use of "these enclosed screws being to act as pumps for clearing the "*double bottom and double* sides of the body of the vessel from

“ water for the purpose herein-after explained. A steam or other
“ motive-power engine or engines are used to work the twin
“ screws and the herein-before described archimedean pumps or
“ water clearers. When the vessel is used as a floating graving
“ dock for lifting navigable vessels or other submerged or
“ partially submerged heavy bodies, the rigging, deck, and deck
“ beams are removed, after which one or both of the pontoons
“ forming the bow and stern are disconnected from the body of
“ the ship and floated away; then water is admitted through
“ suitable valves into the hollow bottom and sides of the vessel
“ until she is sufficiently submerged to allow the vessel or other
“ body to be floated or drawn in between the sides, when the
“ water between the hollow bottom and sides is driven out by
“ the rotation of the enclosed screws on the screw shaft, after
“ which, as much water as possible being taken out by this
“ means as convenient, the valves on the port openings are
“ closed, when the remainder of the water is drawn out by the
“ before-mentioned ordinary pumps and independent power.
“ When used for lifting navigable vesels, the same are shored
“ up between the sides of the lift; when it is again desired to
“ float the vessel off the lift, the water is re-admitted into the
“ hollow bottom and sides of the lift until the same sinks sufficiently
“ to allow the vessel to be floated off the lift.

“ It will be observed that there will be a propelling power imparted
“ by the discharge of the water, from the hollow bottom
“ and sides, being driven out by the enclosed screws on the propeller
“ shaft, which said screws are fitted with clutch or other
“ disconnecting gear, so that the same may be thrown out of
“ action when the port openings are closed, and by which
“ arrangement the external screw propeller on the same shafts
“ may be used independently when required.”

[Printed, 4*d*. No Drawings.]

A.D. 1865, November 28.—N° 3045.

MOLS, François.—“An improved nautical safety apparatus.”

A garment of india-rubber is described which can be inflated so as to support the body in the water. It is fitted with wheels for propulsion. These wheels have floats for acting on the water, and crank handles by which they may be turned by the person wearing the garment.

In another modification of the invention "an air and water-"tight boat-like structure" is employed, which is capable of being secured about the waist of the wearer. "The structure may "also be formed to accommodate two or more persons instead of "one, paddles being provided and properly secured for the "purposes of propulsion."

[Printed, 1*s*. Drawings.]

A.D. 1865, December 2.—N° 3090.

SINGER, Isaac Merritt.—"Improvements in the construc-"tion of ocean steamers and paddle wheels for propelling the "same, which paddle wheels are also applicable to the propulsion "of other steam vessels."

The greater part of the specification is taken up with descriptions of the construction of the vessels. The "improvements in "paddle wheels are designed with a view of obviating the loss "of power caused by the resistance of the water to the entrance "and exit of the floats, and consist principally in so constructing "and mounting the said floats, that they shall be able to "accomodate themselves to the pressure of the water on enter-"ing and leaving the same, but shall always remain rigid whilst "immersed.

In one modification of the invention the floats are mounted on "spindles running across the face of the wheel, each float being "composed of three blades mounted at equal angles (sixty "degrees) to each other, and fixed on one boss, which turns "loosely on the spindle.

"In another modification each float is composed of two blades, "each mounted upon a spindle in such a manner that there shall "be a greater area upon one side of the spindle than upon the "other. These blades incline towards each other in the manner "of a pair of dock gates, and their action is that upon entering "the water it comes first against their outer ends which have the "largest area, and by expanding them closes their inner ends so "as to form a solid float, but upon leaving the water the outer "ends rise first, and the resistance of the water being thus "diminished on the outer side of the spindle, the pressure will "open the blades and allow the backwater to pass through." This part of the invention is equally applicable to the propulsion of other steam vessels.

[Printed, 1s. Drawing.]

A.D. 1865, December 13.—N° 3222.

BROOKES, WILLIAM.—(*A communication from Joseph Denis Farcot, Jean Joseph Léon Farcot, Michel Basile Abel Farcot, Joseph Etienne Eloi Chateau, and Emmanuel Denis Farcot.*) — " Improvements in turbines for obtaining motive power, " applicable also to raising and forcing fluids, and to propelling " ships or vessels."

The object of the invention is to give as great velocity as possible to the wheel, while " only a feeble movement is imparted " to the fluid." A shield " conducts the fluid from the inlet " pipe to the floats without permitting it to receive any rotary " movement from the disc. A second shield acts in like manner " to prevent the waste in the delivery chamber from participating " in the rotation of the disc." The delivery chamber " progressively increases in proportion to the amount of delivery to be " effected." The delivery tube is conical. The floats are made of " a disc of sheet metal cut radially and enclosed between two " plates." There " is also a new arrangement of the stuffing " boxes for the axis provided with rings, forming a hydraulic " joint by means of a small passage communicating with the " delivery chamber. Two little spaces formed by small longi" tudinal ribs enclosing a spongy substance constitute a filter, " which arrests sand or other foreign substances which might " arrive at the small passage from the delivery conduit, and only " allows the water to pass into the upper space of the stuffing " box.

A turbine wheel for the propulsion of ships is thus described :—

" The delivery tube is connected by a receiver, which has tubes " capable of being each closed at will to allow of the direction of " propulsion being varied. If a tube opening at the stern is open " the ship moves forward. In order to move backwards this tube " is closed and others inclining forwards are opened. To turn " round or tack about, lateral conduits are opened corresponding " with the direction required. These principles are applicable to " screw propellers by the transformation of their blades into " tubes curved (enroulés) following a curve corresponding to the " speed of the ship, and presenting only their heads as surfaces " of resistance, into which the water enters as in the turbines " *with floats*. The direction of motion is changed by causing

" each of the tubes to make half a turn, at the same time " reversing the direction of rotation."

[Printed, 10*d*. Drawing.]

A.D. 1865, December 14.—N° 3232.

WATSON, John Smith.—(*A communication from George William Smith.*)—(*Provisional protection only.*)—" Improvements " in apparatus for propelling vessels."

The object of the invention is to supply auxiliary motive power to sailing vessels. " There is provided a main spar, which is " carried transversely at the stern of the vessel, and is fitted so " that it can oscillate, having its middle jointed to a truck or " block, which is free to move vertically in guides fixed to the " stern. The main spar has auxiliary spars fixed to each end, and " the outer ends of these auxiliary spars are fixed each to one of " the ships' boats, these boats acting as floats, and keeping the " three spars forming one rigid oscillating beam parallel with the " water surface. On each auxiliary spar there are jointed two " frames, which project down into the water, and have paddles " jointed to them; such paddles being arranged to propel when " moving forward, but to feather when returning backward. The " paddle frames are actuated by means of horizontal or bell- " crank arms, the ends of which are connected by rods to the " ends of spars fixed to the ship. When the ship rolls the ends " of these fixed spars alternately approach to and recede from " the parts of the auxiliary spars immediately beneath them, and " the connecting rods consequently cause the paddle frames to " vibrate, and so propel the ship. Two paddle frames, namely, " one on each side of the vessel, have their bell-crank arms " directed backwards, so that as one frame on each side is moving " forward and propelling, the other two are returning backward " for fresh strokes. The boats are kept steady by ropes carried " forward to outriggers, the ends of which are kept at or near " the water surface by means of floats. When not in use the " apparatus can be easily detached in parts and stowed away on " shipboard, and the main spar may either be detached or it may " simply be raised to its highest position, and be then fixed at " the ship's stern."

[Printed, 4*d*. No Drawings.]

A.D. 1865, December 18.—N° 3269. (* *)

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Julien Belleville.*)—This invention relates to boilers or apparatus for generating steam, and consists of three principal arrangements and combinations of the tubular coil system of construction, respectively applicable as boilers for stationary engines, boilers for locomotive and similar engines, and boilers for marine engines. "These three kinds of inexplosible boilers may be employed for all purposes." Each description of boiler consists of a separate combined arrangement of tubes, enclosed within brickwork or metal casing containing water space. The tubes, closely packed in horizontal tiers, are united by short bends and communicating pipes; they fill the internal space of the furnace chambers, which vary in form and construction in accordance with the kind of steam engine to which they are applied. The flaming gaseous products of combustion from the fire in the lower part of the furnace rise amongst the tubes, which are severally exposed to the burning current. The arrangements for the feed water establish a general water level in the sections of the apparatus, and in the upper section, the steam is superheated and dried on its way to the steam chamber, which is superposed above, and furnished with a safety valve. The mode employed for combining the tubes admits of a free circulation of water through them, and provides means, by the removal of stoppers or plugs, for cleansing them internally. The action of direct currents is interrupted by baffle plates, which cause a general distribution of the fire draughts. All the parts and details are described and illustrated.

[Printed, 3*s*. 8*d*. Drawings.]

A.D. 1865, December 20.—N° 3295.

HANCOCK, FREDERICK LAMB, and HANCOCK, CHARLES LAMB.—"Improvements in propellers for ships and vessels, parts of which are applicable to windmill sails and fan blowers."

The "invention relates, firstly, to screw propellers, and consists in fitting on the propeller shaft or on a boss thereon, at or at about the same point, at an angle of about 45°, more or less, with the shaft, and at about right angles with each other, two semicircular or nearly semicircular plates, which, as the shaft revolves, act upon the water to propel the vessel. The plates

" may either be plain or they be formed with flanges on the " curved edges of their acting faces. The flanges are at their " middle of a breadth, by preference, about equal to the radius " of the plates, and they gradually diminish in breadth towards " their ends, where they meet the straight-edges of the plates." Sometimes plates are employed with the " corners of the semi-" circles removed."

The invention " consists, secondly, of a disc propeller made in " one piece, or in two or more pieces united so as to fit tightly or " to leave a space or spaces between them." One of these discs is mounted at about " an angle of 45°, more or less, on each side " of the vessel on a shaft or on a boss on the shaft, so that a " portion of this disc is below the water, while the remainder is " above the water, as in paddle wheels." Sometimes " two or " more such disc propellers " are employed " on each side of the " vessel parallel to each other on the same shaft." Sometimes " flanges on the outer edge of the discs " are employed, " similar " to these herein-before described with reference to the first part " of this invention, one flange being carried on one side of one-" half or thereabouts of the disc, and another flange on the " opposite side of the other half."

[Printed, 8*d*. Drawing.]

A.D. 1865, December 22.—N° 3314.

DEANE, Edward.—" Improvements in pipes, tubular columns, " and hollow structures for masts, oars, shear legs, life boats, and " ordinary boats, for water, gas, and waste water pipes, and for " other similar structures where great strength is required."

A tube of suitable shape is made of metal, with a web of similar material in the interior. Or there may be a tubular or solid core at the axis, with stays to the external skin. For oars this tubing has a casing of wood, fastened on by iron rings or otherwise.

[Printed, 10*d*. Drawing.]

A.D. 1865, December 29.—N° 3373.

BURCHALL, Benedict.—(*Provisional protection only.*)—" Im-" provements in the construction of side propellers for navigable " vessels."

The propellers have the floats arranged in such a way as to throw the water outwards from the ship's sides. They may be placed at any part of the side, in ships of war conveniently near the "dead wood" aft, where they can be protected by armour.

On the outer ends of the driving shaft large bosses are secured, and upon them the floats are secured. Each float resembles the blade of a screw propeller; by preference, the part which enters the water has both sides slightly convex. The sides of the bosses have "two large saucer-like plates" attached to them. These project outwards from the shaft, and their edges come close down to, and support the blades.

[Printed, 4*d*. No Drawings.]

1866.

A.D. 1866, January 3.—N° 17.

HIRSCH, Hermann.—" Improvements in screw propellers."

In the "improved propeller, the front or entering edge is so " inclined to the axis that it cuts the unbroken water with little " or no resistance, and the rest of the blade gently curves " backwards, being more and more inclined so as to give the " water a gradually increased backward motion, thus not only " avoiding the excessive resistance caused by a sudden impulse on " the water, but also maintaining a uniform reactive pressure " from the unbroken water over the whole breadth of the revolving " blade."

"The two extreme lines and the whole of the intermediary " lines of the surface are spirals comprised in an angle of 60°, " thus generating from the axis to the circumference a hollow " curved or spoon-shaped form of blades." "The points of the " spirals may be rounded off," and their curvatures modified near the axis, to give additional strength.

[Printed, 8*d*. Drawing.]

A.D. 1866, January 5.—N° 44.

WINTER, William.—(*Letters Patent void for want of Final Specification.*)—" Improvements in certain movable parts of loco- " motive, stationary, and marine engines."

"This invention relates to the joints of connecting rods, side " links, slide blocks, or other joints and moveable connections " of such engines, and consists in applying one or two conical

" bushes on and betwixt the crank pin or other pin and the said " rod, link, block, or connection, which bushes are adjustable by " set screws or other suitable means. By means of this invention " a great saving is effected in the cost of fitting and in the wear " and tear of such parts."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 6.—N° 50.

DE MESNIL, Baron OSCAR.—(*Provisional protection only.*)— " Improvements in towing boats on rivers or canals, a part of " which improvements is also applicable to the traction of " vehicles on rail or tramways, or common roads."

When a boat is moved by hauling on a chain lying along the canal bed, two drums are used, of different diameters, to enable the speed to be varied, the chain being wound on one or other as required. A trough is fixed to the side of the boat and the chain runs along it.

Instead of a chain a wire cable may be employed. In this case the drum is used "patented by Fowler, Burton, and Greig" (No. 2889, A.D. 1860), "which is a grooved pulley, the grooves of " which are formed by a number of clips set round the periphery " of the pulley, each clip being composed of two checks or sides " capable of partial rotary motion each round its centre, situate " behind it and outside the grooves," so that when a rope is laid in the groove, "the tighter it is pressed, the more firmly do the " clips hold it." This pulley or drum is fixed on the end of a driving shaft and the cable is led to the pulley by guide rollers fixed to the boat below the water line. Two of these pulleys on the same shaft, of different diameters, may be employed.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 15.—N° 126.

HAMILTON, JOHN.—(*Provisional protection only.*)—" Improve- " ments in propelling ships, vessels, and boats, and in the " apparatus connected therewith."

"This invention relates to certain apparatus to be applied to " ships, vessels, and boats, and has a twofold object, that is to say:—Firstly, it may be used of itself as a propeller; and secondly, " it may be employed as an auxiliary propeller to the common " paddle or screw used on board steamships, or to assist propul- " sion, when this is effected by sails or otherwise, and in boats as an auxiliary to the common oars."

"In carrying this invention into effect, a bar of iron is fixed to "the keel and projecting straight from the bows, at the end of "this bar a cross bar is fixed carrying two flat plates or boards "which are fitted with springs; advantage is taken of the wave "in the front of the 'craft' to which the propeller is attached, "and as the propeller rising with the vessel out of the water is "caught by the wave, which by its travelling movement draws "the 'craft' on its course. A similar propeller may also be "applied to the stern in addition to one at the bows; but in "most cases the propeller at the bow, if made sufficiently large, "will be found to possess the requisite propulsive effect."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 15.—N° 139.

MORIARTY, Cornelius.—"Improvements in the construction "of tube brushes used in cleaning the tubes of marine, loco-"motive, and all kinds of multitubular boilers."

The invention relates to improvements in the "construction of "tube brushes for which a Patent was granted to me in the year "1856, being that numbered 1534, and dated June 30th, these "brushes having the wire, hair, or whalebone, or other suitable "material constituting the brushing or scrubbing part of the "instrument, placed in a compact mass in the form of a screw or "helix, which has sufficient pitch and space between the thread "or threads of the screw to admit of the brush being screwed in "through the ferrule of the tube." "The wire, bristles, or "whalebone of the brush is further disposed in greater quantities "in the middle of the length of the screw, so that it presents "greater stiffness and stability in the middle than at the ends." These brushes are made "by combining and securing the wire or "other brushing material (which is first cut to any given length "to suit the diameter of tube for which the brush is required) "between two, four, six, or other number of wires (or other "forms of iron adapted to hold the brush material and to "form the body of the brush) placed at right angles thereto," twisting such wires or other forms of metal forcibly together, so as to "form a spiral or screw of the required pitch, in order "that the wires or other forms of metal constituting the body or "frame of the brush shall hold the brushing material firmly "between them." To construct them, the inventor says, "I "interpose between such body wires and the brushing materials

" thicknesses of india-rubber or other soft elastic material, which " imparts a better hold, and prevents the brushing wires or fibres " becoming disengaged."

[Printed, 8*d*. Drawing.]

A.D. 1866, January 18.—N° 166.

ADAMSON, DANIEL.—" Improvements in vertical steam boilers " for marine and other purposes."

The invention " consists in the combination of a series of " vertical steam boilers with internal fire-boxes, which are " arranged so as to economise space and increase the strength " and evaporating power. Each vertical boiler consists of an " outer shell or casing of a cylindrical or other form inclosing " the fire-grate and ash-pit. To the roof of the fire-box are " secured the lower ends of the tubes or flues, the upper ends of " which are secured to the top plate of the boiler. A water baffle " plate is or may be introduced to prevent the displacement of " the water. In order to prevent the corrosion of the tubes or " flues in the steam space of the boiler," " that part thereof " is " enamelled with glass or other vitrious substance. The " products of combustion from the series of boilers are collected " into one or more chimneys, and the steam from the boilers is " collected into one or more main steam pipes or domes, but " each boiler may be disconnected by dampers and valves from " the chimney and main steam pipe, so that each portion of the " compound boiler may be cleaned or repaired without interfering " with the working of the remainder."

An " annular tube " is attached to the feed pipe and perforated, so as to distribute the water in the boiler. This tube was patented in No. 1820, A.D. 1862.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, January 22.—N° 212.

HARRINGTON, HENRY.—(*Provisional protection not allowed.*) —" Improvements in propellers for propelling ships."

The " invention relates to submerged paddle or pallet wheels " for propelling vessels, which wheels are usually placed horizon- " tally and below the water-line within cases in the vessel and " with about one-fifth or sixth part of their diameter projecting " from the side of the ship." " What may be termed feathering " floats or pallets " are applied " to such submerged wheels,

" whereby they are kept constantly at right angles to the vessel's " motion during the time they are projected from the vessel's " side and while in the act of propulsion; this feathering of the " floats or pallets also prevents them in a great measure from " carrying round the water with them in their boxes or cases. " The feathering motion may be communicated to the floats or " pallets much in the usual way of feathering the floats or ordi- " nary paddle wheels, each pallet being mounted on an axis with " a crank arm thereon connected with an eccentric by a rod." The submerged wheels are also furnished with a large hollow centre piece, "which displaces water in the case and gives buoy- " ancy to the wheel; this hollow centre piece must "be of " considerably smaller diameter than the paddle box or case. The " wheels may be disposed vertically as well as horizontally."

[Printed, 4*d.* No Drawings.]

A.D. 1866, January 26.—N° 256.

JOHNSON, JOHN HENRY.—(*A communication from Henry Randall.*)—" Improvements in the construction of steam vessels."

Two distinct sets of paddle wheels are used, the after pair about one-eighth larger than the forward pair. They are actuated by separate engines, and in separate compartments of the ship. The after pair are "situate, if on a vessel say 500 feet long, about 150 " feet 'aft.'"

[Printed, 10*d.* Drawing.]

A.D. 1866, January 27.—N° 270.

HOWDEN, JAMES.—"Improvements in the means of and ap- " paratus for steering, manœuvring, and propelling ships or " vessels."

A tube is fixed across the vessel. In it a screw propeller works so as to draw the water in on one side and eject it on the other. The propeller is worked by a shaft gearing with wheels on the propeller shaft. The screw preferred is made "of properly con- " structed blades on two conical centre pieces placed back to back " in the same shaft, the wheels for working the screw being placed " in a fixed covered circular case between." The engines may be connected direct to the screw shaft. For this purpose a water-tight box is fitted to the tube open at one side to the ship. Through this opening a connecting rod passes. The shaft passes through this box, and the propellers are placed one on each side of it. Space is left outside the box for the passage of water along the tube.

A centrifugal pump may be employed to draw in water at one side, and eject at the other, along tubes like the above.

The tube may be arranged lengthwise of the ship. It branches out "at some distance from either end of the vessel," one branch passing to each side. Valves to close either branch enable the ship to be steered. There may be one or more propelling instruments, and the tube need not run the whole length of the vessel.

[Printed, 10*d.* Drawing.]

A.D. 1866, January 31.—N° 310. (* *)

WOODWARD, William, and WOODWARD, John.—This invention, relating to steam boilers and generators, consists in dispensing with the ordinary grate bars, with a view to economy in the production of steam. In most boilers no ash-pit is required, the fire being made upon the metal plates which form the bottom of the furnace, and are surrounded with water spaces, so that the plates only intervene between the water and the body of the fire. Tubular air passages, through the water space beneath the furnace, admit the air necessary to support the combustion of the fuel, the current of the air being hastened by means of a jet or jets of steam, emitted from the nozzle of a pipe or pipes placed in a contracted part of the uptake or flue, pointing towards the chimney. Several examples of these boilers are shown and described, comprising amongst others, a marine boiler, the fires of which rest upon a horizontal water space, which divides the furnace from the ash-pit, the air-current, as in the other boilers, being admitted through the water space by means of short tubes, through which the ashes fall.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1866, February 5.—N° 354.

SPINK, Daniel.—"Improvements in propelling and steering "vessels."

The "improvements consist in propelling and steering vessels "by the impulsive action of water forced out of the vessel." An inlet pipe from the bows communicates with a chamber. An outlet pipe in the stern communicates with the same chamber.

Valves are so arranged as to allow the chamber to be in communication with only one of the pipes at a time. Steam is admitted to the chamber, and the pressure closes the inlet valve and drives the water through the outlet valve. On the supply of steam being cut off, the steam in the chamber condenses, the water enters the chamber through the inlet valve, and the outlet valve is closed. The process is repeated continuously.

[Printed, 10*d.* Drawings.]

A.D. 1866, February 7.—N° 371. (* *)

ABEL, Charles Denton.—(*A communication from Charles Achille Tranchant.*)—(*Provisional protection only.*)—This invention relates to slide and expansion valves for steam engines. The engine cylinder is fitted with two valve boxes; one, the expansion valve box, being superposed upon the other, which is attached to the cylinder and contains the main slide valve. These boxes communicate by a single aperture made in the seating of the upper or expansion valve, which is hollow and provided with two apertures in the face, through which the steam intermittently passes into the main slide box, as the openings in the slide alternately coincide with the aperture through the seating. The free end of the expansion slide rod "is hinged to one end of a double-" ended lever, the other end of which has the requisite rocking " motion imparted to it from an excentric on the crank shaft. " The fulcrum of this lever is capable of varying its position rela-" tive to the points of attachment of the slide valve and excentric " rods, thereby also varying the stroke of the expansion valve " according to the speed of the engine, by being attached to the " slide of a pendulum governor, or to the moving part of any " other known arrangement of governing or regulating apparatus, " and by being made to work in a slot formed in the lever, which " is prevented from rising and falling with its moveable fulcrum " by a curved loop formed on its lower extremity being made to " work on a fixed pin." In locomotive engines, the frictional action of one of the wheels may be substituted for the ordinary governor, and in marine engines, annular steel springs may be substituted for the pendulous governor balls, for effecting the necessary movements of the fulcrum of the rocking lever. No steam is admitted to the piston until it has performed one-sixth of its stroke in either direction, dependence being placed upon the fly wheel to overcome the vacuum which would form alternately behind the piston at each end of the cylinder, until suddenly relieved by the proportionately increased rush of steam. By the adoption of these arrangements, economy in the consumption of fuel is anticipated.

[Printed, 4*d.* No Drawings.]

A.D. 1866, February 9.—N° 409.

RUSSELL, George FitzJames.—"Improvements in the manufacture of wheels for vehicles, railway rolling stock, the propulsion of vessels, and other purposes."

The spokes are made of such a form "that their edges at the stock or nave of the wheel shall register together, their surfaces forming radii of a circle, their outer ends entering the felloes and having shoulders thereon." "The felloes are made each with a projection at one end and a recess at the other, so that when fitted they fasten each other. The tyre is grooved or slotted on its internal periphery in order to receive the corresponding outer surface of the felloes." The wheel may be put together or taken apart in a short time. To put it together, the felloes are placed in the tyre and the spokes inserted in the felloes and made to register at the nave. Then two semi-stocks (one on each side) are applied to the spokes and tightened up by means of screw pins and nuts. The axle is held in position by a recess around its outer extremity, in which two semi-circular collars fit. A layer of gutta-percha or other material is inserted between the stock and spokes. The ordinary shaped spokes are used.

[Printed, 8*d.* Drawing.]

A.D. 1866, February 14.—N° 460.

YOUNG, Henry Burgess.—"Improvements in screw propellers."

In the first part of the invention, in order to strengthen the connection of the blades and the boss in "feathering blade propellers," the shanks of the blades are extended "across a hollow boss, the diameter of which should not be less than one-sixth of the extreme diameter of the propeller." The blade shanks are set "in the boss, transversely to the driving shaft."

In the second part springs are fitted to the shanks of the blades so as to feather them. Projections upon the driving shaft push the blades into the proper vertical position in the water, but allow them to fall back when the resistance of the water is not acting.

Levers may be attached to the shanks, with their other ends fixed to a pipe on the driving shaft. By actuating this pipe by hand-gear from inside the vessel, the blades may be placed at any desired angle.

[Printed, 10*d*. Drawing.]

A.D. 1866, February 20.—N° 530.

SWIFT, Henry Spink.—" Improvements in machinery or apparatus for propelling ships or vessels by hydraulic pressure."

The invention relates to apparatus for propelling ships by hydraulic pressure. " Right and left handed archimedean screw " propellers " work in a cylinder " in order to draw water from " the bottom of the cylinder and to force it into a transverse " cylinder communicating with a chamber or case on each side of " the vessel." These cases have openings through which the water is forced. Valves permit the openings to be closed, so that the water may be driven out either ahead or astern. Force pumps may be used instead of the screws. The propelling apparatus may be placed below the water-line at any part of the vessel. The cylinder is T-shaped. The stern contains the screws, and the arms lead to the chambers at the vessel's sides. Minute descriptions of the manner in which the screws are to be fitted and driven are given.

[Printed, 8*d*. Drawing.]

A.D. 1866, March 2.—N° 638.

CLARK, William.—(*A communication from David Fernando Masnata.*)—" Improvements in steam vessels."

A vessel is constructed of an inner and outer cylinder mounted on the same axis. The outer cylinder is caused to revolve, and thus the whole progresses. The cargo, crew, etc. are disposed in the inner cylinder, and the outer cylinder is divided into compartments of which some are air-tight and help to support the vessel, and some are " open at the periphery " to take hold of the water. At one end the inner cylinder projects, and has affixed to it a " gallery or frame-like structure encircling the outer drum and " *occupying* a horizontal position." " This may be said to be the " *deck* " *of* the ship. In one modification there is no inner cylinder, but the "gallery" is made "the only available part of "the ship," and contains the engines. Two drums on parallel axes are used. Or a screw thread may be formed on the exterior drum (when the two concentric cylinders are used) and the ship will progress in the direction of the axis.

[Printed, 1s. 4d. Drawings.]

A.D. 1866, March 9.—N° 721.

FORSTER, Edward.—"Improvements in the construction of "side propellers for navigable vessels."

The inventor says, "my invention relates to the construction "of that class of side propellers in which the floats are caused to "move or feather on axes parallel or nearly parallel to the line "of the driving shaft, and the propelling surfaces thereof, that "is, of the floats, are kept in a vertical or nearly vertical position "both when in and out of the water.

"I attach paddle wheel framework or radial arms of any ordinary "or suitable description to the propelling shaft. At equal distances from the said propelling shaft and preferably at equal "distances from each other, I support the axes or shafts of the "floats in metal or other bearings formed in the paddle wheel "framework or radial arms. To one of the ends of each of "these axes or shafts I attach a crank or its equivalent for the "purpose herein-after specified. Between the said framework or "radial arms and the side of the ship I place an eccentric wheel "or piece with spokes, near the periphery or ends of the arms "of which there is an opening or connection to receive a pin or "piece from each of the cranks or their equivalents attached as "above described to the axes or shafts of the floats. The centre "part of the excentric wheel or piece with spokes, which acts as "a balance weight in the best position, that is, close to the "shaft, surrounds the driving shaft; it rests in or on an excentric "guide supported in or connected to the side of the ship in "grooves or otherwise. Set screws to move the said excentric "guide and allow for wear are provided. When the driving "shaft is in motion, it will be obvious that both wheels must be "carried round, and that the one being excentric, in distance "equal to the length of the cranks, the floats will be caused to "assume the vertical position first above mentioned, and that "each crank will be at the extreme extension when the excentric

" arm which carries it is at that point of the excentric guide " farthest from the driving shaft, and vice versa."

[Printed, 8d. Drawing.]

A.D. 1866, March 9.—N° 728.

NEWTON, WILLIAM EDWARD.—(*A communication from Addison Calvin Fletcher.*)—" Improvements in paddle wheels for propelling " vessels."

"This invention relates to paddle wheels with the floats of " parabolic or approximating curvilinear form. The advantage " of this form of float is that it enters the water with little jar " or concussion, and leaves the water with little lift, and it acts " with great propulsive effect when revolving in a direction to " act upon the water with its concave faces; but as heretofore " constructed it has failed to operate as well as could be desired " when revolving in the opposite direction, as at times is necessary " for backing a vessel.

"The object of this invention is, firstly, to develope or obtain " in the highest degree the advantages above mentioned, and, " secondly, to remedy the above-mentioned defect. With a view " to accomplish the first result the wheel is divided in a plane " perpendicular to the axis by a partition ring of the full depth " of the floats, thus making the floats of the form of semi-" parabolas or of a form approximating thereto, and rings or " annular rims of similar depth are applied at the sides of the " wheel to enclose the floats laterally for the purpose of preventing the water from escaping at the sides of the wheel, and " the propulsive effect of the floats from being thereby lost. " The floats are arranged in series (two or more in a series) and " those of each series are placed at different distances from the " axis of the wheel, and all in each series are connected at one " end with one of the outer rings or annular arms in or nearly " in the same radial line, but so connected with the partition " ring that the inner one of the series, that is to say, the one " nearest the axis, occupies a position some distance in advance " of the next one, and the latter a position in advance of the " one still further from the axis. The several series are so " arranged on opposite sides of the partition ring, that those on " one side alternate in position with those on the other side. " With the view to obtain an effective backing operation, there " is applied at the back of the above mentioned floats, which

" may be termed the 'main floats,' a set of floats, which may be " termed 'backing floats' having a substantially similar curvi- " linear form, but a reversed curvature, and which are connected " with the outer ring or annular rim of the wheel and with the " main floats; these backing floats also serve as braces to stiffen " and strengthen the main floats."

[Printed, 10*d*. Drawing.]

A.D. 1866, March 14.—N° 759. (* *)

ELDER, John.—The object of this invention is to render the boilers and engines of steam ships, and particularly of vessels of war, capable of being worked with great economy under ordinary circumstances, and yet be able when required, to develope considerable increase of power and speed, for the special purpose, amongst others, of chasing or ramming an enemy, or in the case of a merchant steamer, of escaping from an armed foe. The engines are to be constructed for working expansively, such as those by "Randolf and Elder," termed double cylinder engines, which work, under various modifications, with high and low-pressure steam. The engines of the class described, are fitted with two pairs of cylinders, each pair consisting of a small high-pressure and a large low-pressure cylinder, the steam at high-pressure being worked in the high-pressure cylinder, and thence exhausted and worked expansively in the low-pressure cylinder. In order to meet the requirements of an increased power, the working and other parts of the engines are proportionately strengthened, and the valves between the cylinders of each pair are so arranged, that it is not necessary to interfere in the least with the ordinary valve gear when it is required to work the large cylinders with full pressure, but simply to admit the steam at all times to both ends of the small cylinder, whence it will pass with undiminished pressure through the intermediate valves and passages into the large cylinder, the small cylinder at such times doing no work. The boilers being arranged for producing high-pressure steam do not require additional strength, but are fitted with artificial means for hastening their consumption of fuel, and as a consequence, the more rapid production of high pressure steam. To this end, between the main engines and boilers, are fitted two large blowing fans, and a small pair of engines for working them. The furnaces and ash-pits are closed, and the air is forced into the latter through a system of ducts, whereby the heat of the fires is so greatly intensified, as to raise the increased quantity of steam required to work the large cylinders with full pressure. The fans may be used for driving fresh air into gun turrets, and between decks, and when in action for drawing off the smoke.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1866, March 14.—Nº 766.

MERRIAM, Scovil Sturgis.—"An improved submarine and "torpedo boat."

A boat of this sort is described. At the stern is fitted a screw propeller connected to the shaft by a universal joint, and supported in a swinging frame. The propeller shaft is driven by hand or by an engine operated by compressed air. Arms are attached to the propeller frame, and rudder chains to these arms, so that the boat can be steered by them.

[Printed, 1*s.* No Drawings.]

A.D. 1866, March 19.—Nº 813.

OSBORNE, Charles Stanley.—"A new compound appli-"cable to the lining or covering of bearings, steps, axle boxes, "journals, and other frictional parts of machinery, also to the "construction of pulleys, wheel tyres, screw propellers, and other "like parts of machinery."

The composition consists of gun cotton and vegetable oil (parksine) with which is incorporated "by the aid of benzole, "wood naphtha, or other suitable solvent, plumbago, steatite, "and sulphur in a finely divided state." The sulphur is sometimes dispensed with. Fibrous material is then incorporated with it, and the whole is to be formed into a uniform mass, and compressed to make it solid. The proportions suggested are:—

Parksine compound - - -	1 lb.
Plumbago - - - -	½ ,,
Steatite - - - -	½ ,,
Sulphur - - - -	½ ,,

or without sulphur 1 lb. of steatite. The amount of fibrous material varies.

[*Printed, 4d.* No Drawings.]

A.D. 1866, April 5.—N° 982.

PHILLIPS, WILLIAM HENRY.—"Improvements in rotary "pumps."

Amongst the uses to which the improved pump may be put, "is discharging a column of water for propelling vessels." A circular chamber is mounted on a stationary hollow axis. Upon the axis, "and within the revolving chamber, a cylindrical drum "or chamber or one or more pipes is fixed, and one or more "passages are so formed around the circumference of the fixed "chamber or at the ends of the pipes, the openings being so "formed as to be in a direction opposite to the motion of the "revolving chamber. Orifices are formed through the hollow "axis forming communications between the interior of the "revolving chamber, other orifices being formed through the "hollow axis communicating with the interior of the fixed drum, "and a division is placed in the hollow axis between the orifices "communicating with the outer and inner drum. One end of "the hollow axis is connected by a pipe or hose with the fluid "to be raised, and upon causing the chamber above described to "revolve, such fluid will be drawn through the supply pipe into "the hollow axis, and through the first set of orifices into the "revolving chamber, and by the centrifugal force the fluid will "be driven against its inner periphery. Division plates or vanes "may be fixed against the sides and in the periphery of the "revolving chamber, which by its continued revolution will "force the fluid by means of the momentum communicated to "it through the passages into the interior of the stationary "drum, and from thence through the orifices in the hollow axis "from which it will be forced into any suitable discharge pipe or "passage. The revolving drum may be buoyed up by surrounding it with a chamber containing water or other fluid."

[Printed, 10d. Drawing.]

A.D. 1866, April 9.—N° 1012.

MACGEORGE, IVIE MACKIE, and MACGEORGE, SAMUEL.—"A new or improved vertically-floated paddle wheel."

"The object of this invention is to secure a vertical position to the floats in all points of the circle (the centre of "which is centre of paddle wheel main shaft) through which

" they may revolve. This object is obtained by the following " means :—

"First, a shaft," designated " the float shaft," " is attached to " each float, having one end resting in the inner or outer (with " regard to the side of the vessel) ring, whilst the other end " projects through the opposite ring as far as necessary.

"Second, to the projecting end of each of the float shafts " " is " attached a lever, one end of which is made fast thereon whilst in " the other end is fixed a pin, the centre of which may be placed " in any point of the circumference of a circle, having for its " radius the distance from the centre of said shaft to the centre " of the pin on levers."

"Third, arms extending from a disc or eccentric (or other " suitable arrangement) have in the end of each arm a bearing, " which bearing is connected with the said pin," "and revolves " freely thereon.

"Fourth, the centre of the said disc may be placed (respectively " with regard to centre of pin in levers herein-before mentioned) " in any point of the circumference of a circle, having for its " radius the distance from the centre of paddle wheel main shaft " to the centre of said disc.

"Fifth, distance between the centre of the paddle wheel main " shaft and the centre of the float shafts " " must be the same " as the distance between the centre of said disc, and the centre " of the pin in levers."

Sixth, the disc may be placed on either side of the paddle wheel.

"The estimated advantages of the vertical floated wheel are :—

"First, the floats always retaining a vertical position altogether " do away with what is called 'backwater,' thereby allowing a " greater speed to be obtained from the vessel.

"Second, when centre of the paddle wheel shaft is beneath the " water by half the width of float, the floats still exercise a more " perfect propelling power than floats of ordinary wheels.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 30.—N° 1216.

MURPHY, WILLIAM JEREMIAH.—(*Provisional protection only.*) —" An improved method of and apparatus for propelling ships " or vessels."

"This invention relates to the propulsion of ships or vessels "by hydraulic pressure. The pressure is obtained by the displacement of the water (by the weight of the ship) forcing the "former up a pipe fitted in the bottom of the ship. To the "inner end of this pipe is connected a horizontal cylinder "placed longitudinally or in the direction of the ship's length, "and fitted with a piston, the diameter of the said piston being "about the same as that of the pipe. The pressure of the water "on the piston forces the piston into another cylinder containing water; beyond this water is another piston, and so on "until a sufficient power is attained. The last piston forces "against a cross beam or other fixed part of the ship, and thus "forces or propels the vessel forward."

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 4.—Nº 1262.

FURRELL, Frederick.—(*Provisional protection only.*)—"An "improved method of fixing rowlocks, crutches, and thowls to "all descriptions of boats and craft propelled by oars."

The rowlock is fastened to a bar in such a way that it can be folded over into a box formed for the purpose. When required for use it is held in the proper position by a bolt passing through the bar; when not required, the bolt is removed and the rowlock folded down.

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 5.—Nº 1284.

BROOMAN, Clinton Edgcumbe.—(*A communication from Greenleaf Stackpole.*)—(*Provisional protection only.*)—"Improvements in drawing or propelling boats, barges, rafts, and other "similar structures on canals, rivers, and such like waters."

"This invention applies to the traction or propulsion of boats, "barges, craft, rafts, and other similar structures in canals, "rivers, basins, and other waters.

"A continuous rail or bar or its equivalent" is constructed "along the side of the canal or navigable water, which rail or "bar is grasped by traction or friction wheels operated by steam "or other power in the boat to be moved. This continuous rail "may be made of steel, iron, or wood, carefully joined, and of "uniform thickness. It is attached by any convenient means "to upright posts firmly fixed, and ranging along with the

" direction of the canal. It may also be supported by other " means, so that the rail shall hang downwards instead of standing up, and in some cases it may be convenient to use a flat " linked chain or geared arrangement. The traction or propulsion is effected by means of traction or friction wheels which " grasp the rail and are rapidly rotated in opposite directions by " means of gearing and any well-known apparatus connected " with the motive power in the boat. One only of such wheels " may be rotated, and in that case the other serves as a guide; " and to ensure the requisite pressure or friction, the yoke which " connects the two wheels is provided with set screws. These " traction or friction wheels are mounted on arms or shafts of " square section, which have a sliding telescopic motion inside " hollow sleeves, so as to adjust themselves to the varying motions " of the boat; and the machinery is arranged in any convenient " or well known manner to allow of a rocking and lateral as well " as an up-and-down [motion. To secure the wheels in their " proper position they are provided with flanges which run in " a groove or channel prepared in the rail for the purpose.

" Each boat may be provided with the required machinery, or " one so provided may be employed as a power boat to draw " a number of ordinary boats. Instead of rudders or steering " apparatus, which are injurious to canals, a guide or guides which " slide and adjust themselves to the variations of floatation are " fixed to each boat and run along the rails. By this means not " only is the pressure and labor of the steersman dispensed with, " but the least possible motion and disturbance are imparted to " the waters of the canal."

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 8.—N° 1311.

JOHNSON, JOHN HENRY.—(*A communication from Jean Pierre Victor Le Rouge.*)—" Improvements in apparatus for propelling " and steering ships, partly applicable to the transmission of " motive power."

Instead of a rudder, the propeller is mounted so as to be capable of being worked in various directions to steer the ship.

A hinged frame is attached to the stern and the axis of the propeller fitted into it, " In carrying out this invention in " practice it is proposed according to one arrangement to attach " a hinged frame to the stern of the ship and to fit the axis of

" the propeller, which is separate and distinct from the propeller " shaft, in the hinged or moveable portion of the frame. On the " inner end of the axis of the propeller there is keyed a bevel " wheel, which gears into a second bevel wheel turning loose on " a vertical shaft, which shaft serves as the steering shaft, it being " turned either by an ordinary tiller or by a steering wheel in any " well-known manner. The second wheel gears into a third bevel " wheel fast on the end of the propeller shaft of the engine. It " will thus be seen that the rotary motion of the propeller shaft " will be transmitted to the propeller through the three bevel " wheels above referred to, whether the propeller be in a line with " or at an angle to the keel, according to the position of the " moveable frame. The frame is moved or turned on one side or " the other by means of the vertical shaft which is keyed to the " moveable or hinged portion of the frame, so that the propeller " can be made to operate in any desired position. The working " parts are lubricated by making an oil passage in the vertical " shaft, such passage communicating by other passages with the " bearings of the propeller.

" According to a second arrangement it is proposed to employ " only two toothed wheels in lieu of three, for transmitting motion " to the propeller. For this purpose two semi-spherical wheels " are employed, having teeth on their rounded surfaces, one of " such wheels being keyed on to the inner end of the axis of the " propeller, and the other keyed on to the outer end of the propeller shaft. The curved surfaces of these wheels enable the " axis of the propeller to be turned to any desired angle withou " interfering with its gearing with the other wheel. The moveable portion of the frame which carries the propeller is con" nected above and below the gearing by radius links to the fixed " portions of the frame, the upper link being made fast to, and " turning with, the vertical or steering shaft, two pairs of toothed " sectors, the one carried by the moveable portion of the frame " and the other by the fixed part, serving to keep the semi" spherical gearing at the proper distance apart in whatever " position they may be turned."

[Printed, 8*d.* Drawing.]

A.D. 1866, May 18.—N° 1415.

GRIFFITHS, ROBERT, and **RIGG**, ARTHUR, junior. — (*Provisional protection only.*)—" Improvements in apparatus for propel" ling and steering steam vessels."

Improvements upon No. 874, A.D. 1864. Instead of a number of fixed curved blades fixed behind the propeller, one or more is used, capable of being adjusted at different angles. Two blades, either curved or flat, may be placed one above and one below the axis of the propeller. They are to be placed "radially or nearly "so." By suitable shafts their angles may be altered. If only one or two fixed blades are employed, "the stern or rudder post "may be so shaped as to act upon the column of water projected "backwards," in the same way as the arrangement of blades.

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 21.—N° 1433. (* *)

CRICHTON, Alexander.—This invention relates to apparatus for condensing the steam from marine engines, whereby the use of an ordinary surface or other condenser, and of the circulating pump are dispensed with. The eduction pipe from each cylinder conducts the steam into a feed water heating vessel, where a portion of the heat contained in the steam is imparted to the water as it passes on to the boiler; thence the steam is conveyed by suitable pipes through the skin of the vessel into metallic tubes disposed outside low down beneath the surface exposed to the cold sea water. These tubes are attached outside to the vessel, extend horizontally under the quarter towards the stern post, and return along the other side, or communicate aft with tubes which convey the water of condensation inboard to a conduit at the foot of the air pumps, or to other convenient place for collecting the fresh water, and utilising the vacuum produced by the condensation of the steam. Suitable arrangements are made, that in the event of the external tubes being injured by accident or otherwise, an ordinary condenser and circulating pump can be brought into operation.

[Printed, 8*d*. Drawing.]

A.D. 1866, May 29.—N° 1497.

BOYMAN, Richard Boyman.—"Improvements in propelling "vessels by the reaction of water, and in the machinery for the "purpose."

A "hydro-propeller" is described, which consists of a wheel similar in form to a paddle wheel. It works in a channel open at the ends to the water for ejection and admission. Divisions project from the sides of the chamber in which the wheel is situate, and abut against the periphery of the wheel, to prevent the water from being carried over the wheel. To enable the floats to pass over these divisions they are made to slide radially in grooves in the wheel, and are actuated by having their ends resting against a fixed cam.

"For a horizontal arrangement one propelling pipe goes " through one side of the vessel, and another pipe through the " other side, as far beneath the water line as may be convenient. " The pipe is as free from curve as the hydro-propeller will " permit, and not much longer than its diameter. It is parallel " to the vessel, with its mouth open towards the bow, and the " end having a contracted vein towards the stern. The diameter " of the pipe is much greater than that of the contracted vein. " At both ends it has a slightly divergent mouth-piece for the " easier entrance of the water, that at the contracted vein end for " such entrance when backing. In the middle of each pipe is " fitted a single or horizontal double action rotary hydro-propeller, " the floats of which protrude through the side of the vessel for " the incoming water in the pipe to act upon."

To back the vessel there are "two vertically hung door valves " in each pipe opening inwards, one at the entrance, the other at " the exit of the propelling water, and of the same diameter as " the pipe. Each valve has a hole in the middle of it, of the " diameter of the contracted vein which each valve forms. When " the hydro-propellers move, they will move the water behind " them, and more will rush in to supply its place. The pressure, " therefore, will open and keep open one door valve for the " entrance of the propelling water, and keep closed the other at " the end for the water to issue through the contracted veins of " such door valve. The same action will take place when the " engines and propellers are reversed for backing. Thus one of " the principles of" the "invention will always be applied when " propelling, namely, one end of the pipe will be fully open for " the free entrance of the water, and the other end contracted for " its exit and reaction."

The claims are—

1. "A propelling pipe for reaction propulsion with its mouth " towards the bow, fitted with expanding and contracting " valves."

2. "The same submerged propelling pipe without valves," " *when it is so much less* than the length of the vessel that the

" friction of the propelling water, and consequent loss of power, " will be so reduced as to make such a pipe an equivalent, or " approximately so, for the pipe with expanding and contracting " valves."

3. " For hydro-propulsion a divergence of pipe at each end for " for the easier entrance of the water, and to prevent the formation of the contracted vein."

4. " The contracted vein for reaction in combination with an " open entrance for the water."

5. A " permanent contracted vein nozzle," " either fixed or " moveable," " in combination with another entrance for the " water, and expanding and contracting valves."

6. " The method of working the expanding and contracting " valves shown."

7. The cam, float boxes, and other parts of the " hydro- " propeller " described.

8. " Six, eight, or more " floats in the propeller.

9. " The application of a horizontal or vertical propeller, partly " protruding through the sides or beneath the vessel to work in " propelling tubes outside."

10. Side rudders and other matters not connected with hydropropulsion.

11. The general combination of the various parts, etc.

[Printed, 3*s*. 2*d*. Drawings.]

A.D. 1866, May 30.—N° 1509.

EVELYN, George Palmer.—" A new or improved apparatus " for propelling boats and vessels."

A lever works vertically on a hinge at the stern of the vessel. To the lever is pivotted a paddle. The end of the lever is forked, and the prongs, between which the paddle is hinged, regulate the angle at which the paddle is worked. The same method may be applied horizontally. The joint where the lever passes through the stern is made water-tight by an india-rubber tube or otherwise. The lever is worked by manual power or otherwise.

In large vessels a rod slides vertically in guides and has a reciprocating motion given it from an engine. To this rod the paddle is hinged. Springs are applied to ease the shock when the paddle is reversed. The guide and paddle may be turned to work as a rudder and steer the vessel.

[Printed, 10*d*. Drawing.]

A.D. 1866, June 2.—N° 1538.

NEVILLE, Thomas, and GORTON, William.—(*Provisional protection only.*)—" A new or improved means of propelling " vessels."

The "improvements in propellers, while particularly applicable " to paddle wheel steam ships in lieu of the flat board paddle or " float now in general use, can also be applied in various other " ways to the propulsion of steam ships, and to canal, river, or " other boats.

The invention consists of a paddle, " the face of which on each " or either side is divided into any number of open acute angular " recesses of dimensions according to the propelling power " required. The said angular paddles or floats during the revo- " lution of the paddle wheels, strike the water with much less " concussion than the present flat paddle board or float, in con- " sequence of their sharp angular edges cutting the water as they " enter, and on rising, the water flows easily from them as through " a series of spouts. The said propellers can be fixed to the " paddle wheel at any angle required or to work on their own " axis. They can likewise be constructed with fluted, round, " and other shaped edges instead of sharped edges if desired, " and the recesses be of semi-circular oval, or of other form or " shape.

The "improved means for propulsion may also be used as " oscillating submerged propellers, either by themselves or as an " auxiliary as follows:—At each end of the horizontal work- " ing shaft outside of a vessel (and on each side thereof) a " vertical shaft is to pass, to which vertical shaft are to be " attached on each side of the vessel two or more separate open " angular propellers or arms, which being submerged at each " side of the vessel make an alternate propelling oscillating stroke " describing the arc of a circle, and which stroke from the said " top or bottom propellers keeps up a continuous propelling " motion.

The "propellers may be manufactured of cast or wrought " metal, or of any other material or substance, and they may be " used mixed alternately with the present flat paddle board or " float if desired."

[Printed, 4*d*. No Drawings.]

A.D. 1866, June 22.—N° 1666. (* *)

PARKER, JAMES.—This invention relates—

1st. To applying the elastic force of steam under pressure, or of compressed air, to vessels containing water, for the purpose, by acting direct upon the surface of the water without the aid of a piston, of raising and ejecting the water through suitable pipes in any required direction. The steam jets and air nozzles, described in the Specification of two prior Letters Patent granted to this inventor and dated respectively February 28, 1862, No. 552, and October 25, 1863, No. 2620, are preferred for the purpose.

2nd. To propelling vessels by means of jets of water, which are forced out through delivery pipes situated respectively at each side of the deadwood of the vessel contiguous to the stern post below the water line, by the pressure of steam or compressed air. For this purpose, two closed vessels or tanks are disposed in the after part of the ship below the water line. Each tank is fitted with an outlet pipe, which communicates with the water outside the vessel, and is closed by a valve opening inwards; the inner ends of the delivery pipes are connected to and open into the tanks. By means of suitable pipes, the steam or compressed air is admitted to the vessels alternately, so as to produce a continuous ejectment of the water by turns through the delivery pipes at the stern, the internal pressure, whilst this part of the operation is going on, alternately closing the inlet valves. Instead of two delivery pipes, one to receive the alternate discharge from the tanks may be employed. The reaction of the external water on the outflowing jets, causes the vessel to go ahead.

3rd. To employing the same kind of apparatus, with some slight modifications, for pumping and raising water.

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 9.—N° 1802. (* *)

ELDER, JOHN.—This invention relates to marine steam engines, which, in order to obtain economy in fuel, are arranged to be worked on the double cylinder expansion principle, comprising, with a view to diminish cost, a single small high-pressure oscillating cylinder working in conjunction with a fixed single large low-pressure cylinder. The low-pressure cylinder, in one of the modifications described and exhibited on the drawings, is seen fixed in an inclined position upon a cast metal framing, with the piston rod pointing obliquely upwards in the direction of the crank shaft, directly under which the small oscillating high-pressure cylinder is mounted on trunnion bearings, the head of its piston rod being coupled beside the couplings of the connecting rod of the large cylinder on the same throw pin of the crank. Both cylinders are steam jacketed, and provided with ordinary slide and other valves, the low-pressure cylinder having a cut-off valve in addition. The steam exhausted from the high-pressure cylinder enters a receiver, which may be an interposed enlargement in the passage from the small to the large cylinder, otherwise the steam is conveyed to a compartment in the boiler, and there reanimated before its use in the low-pressure cylinder. The condenser and the various pumps are disposed between the two cylinders. These engines are designed to drive paddle wheels.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, July 11.—N° 1822. (* *)

FRASER, Robert William.—(*Provisional protection only.*)—This invention, relating to apparatus for obtaining motive power, actuated by steam, water, or other fluid, it is stated, may be advantageously employed where high speeds are required, and economically for auxiliary purposes, as the heat and power can be utilized without loss after passing through the engine, which comprises a cylindrical case, wherein, fixed upon a longitudinal axis, which passes concentrically through fluid-tight bearings or stuffing boxes fixed respectively on the ends of the cylindrical case, is a screw or instrument with radiating blades helically curved. One end of the case is furnished with an inlet, opening to the steam supply and governed by a valve, and at the other end there is an outlet for the egress of the steam, which passes through the instrument in a constant stream, and acting by the force of impact upon the blades, they, together with the shaft, are caused to rotate. It is proposed that the steam after emission, should be employed to drive an ordinary engine, or for heating purposes.

A modification of the first arrangement is described, and reference is made to a "direct-acting swivel float propeller," which the *inventor has* described in the Specification of a former

Patent dated October 5, 1865, No. 2563. This propeller it is proposed to drive by two apparatus constructed according to the present invention, and acting as auxiliaries to a pair of ordinary engines, which would receive the steam emitted from the two apparatus.

[Printed, 4d. No Drawings.]

A.D. 1866, July 21.—N° 1890.

TROTMAN, Henry.—" Feed box for the prevention of injury " to marine boilers with surface condensing engines."

A box is fitted to marine boilers " for the purpose of arresting " the impurities of the condensed feed water." It is fitted " with " a series of tubes or iron rods or bars supported in two end or " side plates in such manner as to form altogether a framework " which can be removed with ease from the box or chamber. Both " the end or side plates are perforated, so that the ends of the " tubes, rods, or iron bars may be passed through and extend " beyond the end or side plates, and one or both end or side " plate may in addition be perforated with round, half round, or " other shaped holes; or the tubes, rods, or bars may be made so " as to fit the perforated end or side plates just loosely with a " 'loose fit.' " The framework thus formed is placed in the box or chamber " in such manner that two of its sides or ends fit " closely to two of the sides or ends of the box, leaving two " spaces between the other sides or ends (as the case may be) of " the framework and the sides or ends of the box or chamber." A plate of zinc is placed " inside the box between the ends of the " tubes, rods, or bars, and the box. Above this framework of " tubes or iron rods or bars and end or side plates," is placed a top plate called an " inner top plate, which covers not only the " said framework, but also the spaces just mentioned, fitting " closely to the sides and ends of the box, but capable of being " with ease removed; this inner top plate forms with the perforated end or side plates of framework an inner chamber; above " this inner top plate " is in some cases placed " another framework of tubes, rods, or iron bars to receive any impurities that " may escape from the inner chamber in which the first framework is placed. Above the inner top plate or covering placed " over the under framework" is placed " a zinc plate longitudinally " *inside* the box on each side between the upper surface of inner " *top plate* or cover of the lower framework and the under sur-

" face of the outer top plate or cover of feed box, or at sides of " upper framework."

[Printed, 8*d.* Drawing.]

A.D. 1866, July 26.—N° 1939.

KOCHS, William Edward.—(*Provisional protection only.*)— " Improvements in steam slide valves for locomotive, marine, and " general steam engine and water valves."

" The object and principle of these improvements in slide valve " consist in the relieving the valve of the pressure caused as " hitherto by the steam in the chamber, thus reducing the friction " against the surface of the cylinder. This valve might be called " an equilibrium valve, instead as hitherto the steam entering " into the valve chamber, thus surrounding the slide valve and " pressing upon its upper surface, the same is by the present " mode of distribution lodged below the valve in two parallel " steam jackets cast in the body of the cylinder, of which one " is on each side of the opening for cylinder channels; there " are consequently five openings instead of three as hitherto on " the surface of the cylinder. The valve closing tightly upon " the cylinder surface will prevent the steam from entering into " the steam chamber. The valve has " " either one or two steam " channels besides the exit opening, they are so constructed that " by return of piston the steam will enter either full or with " expansion at convenience from one steam jacket direct through " the valve channel into that side of the cylinder where it is " needed, and the same by the return motion. The pressure " upwards from underneath the valve is counterbalanced by a " certain amount of steam pressure in the chamber, which may " be completely and accurately regulated by a safety valve, thus " giving either more or relieving the valve of its pressure and " friction."

[Printed, 8*d.* Drawing.]

A.D. 1866, August 15.—N° 2091. (* *)

DE RUSETT, Edwin William, and DALE, Richard Farrell.—This is an invention of a self-acting steam pump or apparatus for raising water, which is lifted by forming a vacuum in the pump cylinder, wherein steam is alternately admitted and condensed by jets of water or otherwise. " Steam or other vapour [illegible] "into a chamber or cylinder; this [illegible] cylinder and causes a vacuum, which is [illegible] other liquid entering the chamber through [illegible] valves. As the liquid rises in the chamber, it [illegible] to rise with it until the float comes in [illegible] or tappet, which operates on a valve or [illegible] in steam to the chamber, so as to drive [illegible] the chamber through an outlet valve; the float [illegible] liquid until it comes in contact with another stop [illegible] closing the steam inlet valve, when vacuum is [illegible] by means of a jet of water or other means for [illegible] the steam, and the same action occurs as before [illegible] The liquid may leave the chamber by ordinary [illegible] valve or valves with or without an air vessel and rising [illegible] the chamber itself can rest on a seating, when the [illegible] of the vapour will cause it to rise, and thus it will [illegible] the liquid to escape. If more than one chamber be [illegible] they may be made to balance one another." By using [illegible] cylinders a steady discharge may be obtained.

[illegible] arrangements are described for pumps with one or [illegible] cylinders designed to operate on the above principle and [illegible] of the various uses to which such pumps may be [illegible] including the filling of locomotive tanks, as bilge pumps [illegible] vessels, and for propelling vessels by the re-action of the [illegible] against currents of water discharged outside the vessel [illegible] pumps; some of the arrangements of pumps are pro- [illegible] with a plunger for working by hand, and others are com- [illegible] with a small engine whereby to work the valves. In some [illegible] the cylinders are enclosed by jackets containing air.

[illegible] Drawings.]

A.D. 1866, August 22.—Nº 2157.

[illegible]—"Improvements in propelling ships and [illegible] vessels."

[illegible] says:—"This invention consists in propelling [illegible] a mixture of air and water (being the [illegible] upon and against the surface water of [illegible] which the vessels are to be propelled. To [illegible] or other pipes terminating in single or [illegible] sufficient volume for the tonnage of the vessels

" acted on. The outlet of the pipes conveying the propelling " medium may be placed at an angle of 45 degrees with the " horizon at each side of the vessel at a suitable height from " the water surface into which the air and water (propelling " medium) is forced downwards, the air quickly rising under the " inclined channels under the sides and bottom in bubbles as " rollers, lifting the stern of the vessel which runs away from " the lift. The said inclined channels placed along the sides " and bottom of the vessel are described and shown by diagrams " in the Specification of a Patent granted to me the said George " Carter, bearing date 17 May 1856, No. 1178. I do not confine " myself to the position of the jet pipes, but the more they are " placed forward the propelling medium will act under a larger " amount of surface of the inclined channel, giving greater " velocity to the vessel when driving her ahead or when the " pipes are reversed astern." Any convenient machinery may be used.

[Printed, 8*d*. Drawing.]

A.D. 1866, August 28.—N° 2217.

HUDSON, Richard Harvey.—" Improvements for preventing " the fouling by and clearing ship's propellers from ropes."

The invention " consists in fixing a metallic disc to the rudder " post at the part where the boss for the screw shaft bearing is " situated and aft the screw, the entire edge in this case being " formed sharp. The action of this in preventing the fouling of " propellers by ropes is as follows :—As soon as a rope becomes " entangled with the screw and its shaft, the revolution of the " screw causes the rope to be wound thereon, and this action " brings the rope at once in contact with the cutting edge " above referred to, the winding of the screw each instant drawing " the rope tighter over the sharp edge the rope is at once cut in " half, so that by means of this invention a rope can never be " entangled over the screw by more than three or four revolutions. " The upper and lower edges of the disc may be formed with " horns on them, so as to assist in catching the rope for the " cutting action to take place, and the entire circumference of " the disc may be formed with a scolloped edge for the purpose " of rendering its action more efficient."

The discs may be made in two pieces, so that they can be removed *with taking out* the screw shaft.

[Printed, 10d. Drawing.]

A.D. 1866, August 30.—N° 2237.

CLARK, WILLIAM.—(*A communication from Joseph Athanase Ganeval.*)—"Improvements in apparatus for propelling and "steering vessels."

The frame enclosing the propeller is "open at the rear." It consists of "several blades of similar dimensions disposed one "behind the other," "obliquely on the shaft." The propeller may be enclosed in a "cylindrical caging." Tubes may pass from the fore part of the vessel to the opening in which the propeller works to supply it with water. The propeller can be fitted to any vessel instead of the screw by removing the rudder. To steer the vessel two small propellers working on a transverse shaft are used. Motion is communicated to them by gearing on the main shaft.

[Printed, 1*s*. Drawings.]

A.D. 1866, September 10.—N° 2327.

CURTIS, WILLIAM JOSEPH.—"Improved apparatus for steering "steam vessels."

Improvements on 1782, A.D. 1862.

"The screw has a hollow spherical boss from which projects a "short shaft that has its bearing in the after stern post. The "propeller shaft has a spherical termination which fits the hollow "spherical boss, which boss is packed with radial blocks of wood "to give a good bearing to the end of the propeller shaft. "Through the spherical end of the shaft a slot is made of "suitable form to receive a transverse pin, and which is secured "in position so as to be free to oscillate therein. The ends of "this pin project beyond the shaft, and form trunnions which "enter journals formed in the hollow boss. This arrangement "constitutes a joint that allows of the screw being driven by the "rotation of the driving shaft, and of swinging upon the end "thereof in answer to the movements of the steering wheel. "The shaft of the after stern post is made hollow and passes up "to the deck, and it carries a block keyed firmly thereto for the "purpose of receiving the couplings (whether pins, clicks, or "other suitable contrivances) by which it is connected temporarily "with one or two segment racks; one of these segment racks is "mounted loosely on the hollow shaft, and the other is keyed to "a shaft which passes down through the hollow shaft. Both "segment racks are intended to gear with a shifting pinion on

" the steering wheel shaft." "The central shaft is connected by
" a link arrangement with the rudder shaft, and it thus transmits
" motion to the rudder from the segment rack keyed on its upper
" end; when, however, this rack is locked to the block of the
" hollow shaft, the rudder will move with the swinging stern post
" and with the screw, but when it is free, the rudder may be
" be made to answer to the steering wheel without affecting the
" position of the swinging stern post and screw with respect to
" the line of the keel."

[Printed, 10*d.* Drawing.]

A.D. 1866, September 11.—N° 2339. (* *)

BOUSFIELD, George Tomlinson.—(*A communication from Jean Baptiste Thierry, junior.*) — (*Provisional protection only.*) — " Improvements in apparatus applicable to marine steam " boilers."

Jets of superheated steam are blown on the fire through nozzles supplied with steam from a box of malleable cast-iron fitted over the fire-door of the furnace. The steam is first superheated in an apparatus placed in the up-take, and is then further heated by conveying it through pipes in the furnace into the blowing apparatus, which is itself heated *in situ* over the fire door.

[Printed, 8*d.* Drawing.]

A.D. 1866, September 26.—N° 2489.

BOULTON, Matthew Piers Watt.—(*Provisional protection only.*)—" Improvements in apparatus for employing the motive-" power of jets of fluid."

" When this invention is used for the purpose of propelling
" ships or vessels moving through water, the apparatus and
" method employed are as follows:—The ship or vessel to be
" propelled carries with it a vessel in which aeriform fluid is
" generated or contained under pressure, and a jet of fluid issues
" from a nozzle or orifice communicating with this vessel; this
" jet issues into the water at the hinder part of the vessel in the
" direction in which it is desired to impel the vessel, or nearly in
" that direction, and produces a current of water also moving
" in like direction. The current thus produced impinges on a
" curved surface, or flows through a curved channel attached to
" the ship or vessel which it is desired to propel. It may be

" deflected by this surface through various angles, but it is best
" that it should be so deflected as to be turned backward, so as
" to quit the surface in a direction contrary to that which it had
" before impinging on the surface. The pressure exerted by the
" current on the surface or body on which it impinges and by
" which it is deflected, propels the ship or vessel, urging it to
" move in the direction in which the pressure acts. The current
" before impinging on the deflecting surface may pass through a
" passage or passages in which its velocity is reduced and a
" portion of its vis viva converted into pressure or potential
" energy, so that it may act on the surface partly by pressure and
" partly by vis viva, as takes place in a turbine." The jet may be steam " or other aeriform matter." The direction of the ship may be controlled by altering the directions of the jets.

[Printed, 4*d*. No Drawings.]

A.D. 1866, September 28.—Nº 2508.

JOHNSTONE, JOHN STUART.—" An improved means for pro-
" ducing motive power, and the machinery or apparatus employed
" therefor."

The object of the invention is to utilise the force produced when a composite bar of metal is heated, by its tendency to curve to the side on which the less expansive metal is.

A metallic framework contains several sets of compound bars (preferably of iron and brass) arranged in parallel rows. The bars are arranged with the two metals of similar sorts next each other, so that each set may bend in a different direction to that next it. The first set works against a fixed bearing piece at one end, and with the other end against the second set, and so on for several sets, each set working against another, so that by the combined expansion the last set is moved considerably. Two chambers are used, one is being heated while the other is being cooled, so that a motion is obtained in both directions. The motion obtained is transmitted by convenient means to a crank.

A lamp or other heater may be employed.

An apparatus for working a cooling fan is described.

Amongst other uses, the apparatus may be made to propel ships.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1866, October 9.—N° 2598.

FORBES, Hugh.—"Improvements in apparatus for the raising
" and propelling of water or other fluids, applicable likewise as
" a ship propeller, motive power, fan, meter, and for other
" purposes."

The cogs of the drums of rotary pumps, suitable for purposes of hydro-propulsion, are so formed that the drums gear into one another at or near "that part where the pitch circles " of the two meet." In wheels with small teeth the "teeth take " a spiral direction from end to end of the drum." In wheels with larger teeth the teeth are nearly or quite longitudinal. The spaces into which the teeth gear are fitted with india-rubber pads beneath which a little air is retained. The drum casing is of such a size that the drums revolve in contact but without scraping it. The flat ends of the drums may be coated with cloth, india-rubber, or other substance.

The other improvements refer to the raising of water to a considerable height, and are not connected with marine propulsion.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1866, October 9.—N° 2608. (* *)

DUDGEON, William.—This invention relates to the construction of ships adapted for propulsion by twin screws, and to steam engines for driving them. As regards ships, the object sought is to provide support for the two screw shafts, which project astern in parallel lines with the keel from under the ships' quarters, and respectively are encased and carry the screws. For this purpose a flat horizontal chamber is constructed on each side and fixed to the skin of the vessel, projecting laterally therefrom so as to enclose and support the screw shafts; and inside the vessel, extending from side to side, is fixed a horizontal plate framing to correspond with the level of the shafts, so as to form a substantial lateral support between the chambers, which are rendered more firm by a transverse vertical bulkhead. The extreme ends of the chambers, wherein the shaft bearings and stuffing boxes are fitted, are further supported by wrought iron diagonal stays or brackets, which are fixed to the sides of the vessel by rivetting through the skin and ribs. The steam engine cylinders are superposed at suitable angles on a central box framing, which also serves as a

October 22.—N° 2723. (* *)

CARNEGIE.—(*Provisional protection only.*)

principally for its object to render steam being more easily manœuvred than hitherto ; employing for that purpose centrifugal or apparatus to be worked by the main or separate cause the projection by suitable passages or stern of one or more streams of water. When formed with one or more wells for the endless dredging buckets, the inlet opening or openings of water to the pumping apparatus is or are after end of such well or wells, but when the buckets at the sides, the inlet opening is placed forward part. As it is of great importance to power of turning and generally manœuvring such dently of the tug usually in attendance, de- are attached to the stern orifices through is projected, whilst to permit of reversing the propulsion, either rotatory reversible pumps are valves are fitted to the water passages com- the pumping apparatus."

“ injecting water into steam boilers by the aid of what is known
“ as the ‘injector,’ viz., the conducting of steam into a pipe
“ having a tapering discharge end, so that it discharges the steam
“ with great power into the cold water, which condenses it and
“ which produces a vacuum, into which the surrounding water
“ flows, and thus when applied according to this invention the
“ steam from an ordinary boiler is made to act directly on the
“ water, so as to dispense with the use of ordinary propelling
“ machinery such as steam engines, paddles, paddle wheels, screws,
“ or any other machinery for that purpose.

“ In carrying out this invention it is proposed to fix in any con-
“ venient part of the keel or bottom of the vessel, or to attach
“ thereto an apparatus constructed on the principle before referred
“ to, which is connected to the boiler by a pipe for the purpose of
“ conducting the steam into such apparatus. The extremity or
“ discharge point of the apparatus is conducted inside one end
“ of a pipe which has its other end open to the water in which
“ the vessel floats. Into this apparatus a stream of water is
“ conducted which is forced out by the action of the steam jet,
“ and acting against the water in the last mentioned pipe (and by
“ it against the water in which the vessel is floating), causes the
“ vessel to be propelled in an opposite direction; this water may
“ be caused to pass from either the sides, stem, stern, or any
“ other part of the vessel, and through one or more pipes or
“ tubes conveniently disposed so as to afford facility for steering
“ or manœuvring the vessel.

“ The apparatus may be made of any suitable size, but should
“ be proportionate to the size of the vessel to be propelled, and
“ the capability of the boiler employed in generating the steam,
“ always allowing ample margin to enable the boiler to use its
“ maximum power in discharging the water. The apparatus can
“ be regulated and adjusted and placed under the control of the
“ officer in charge of the vessel, as well as under the control of
“ the engineer and fireman, provision being made for varying
“ the size of the steam jet orifice and the position of the discharge
“ pipe in relation thereto.

“ There may of course be more than one apparatus in any one
“ vessel, and its position may be varied as circumstances may
“ require.”

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 30.—N° 2809. (* *)

BOULTON, Matthew Piers Watt.—(*Provisional protection only.*) — This invention relates to the propulsion of ships and vessels by the force of currents of water, set in motion and caused to issue from the vessel, by the impulsive energy of jets of fluid under pressure. The fluid is generated or contained in an appropriate vessel so disposed within the ship, that the nozzles whence the jets issue from the generator may direct their force upon the water, which is admitted through channels from the outside, deflected by curved surfaces, and driven through other channels into the sea again in the direction of the stern. The fluid under pressure may be steam or other aeriform matter, and the direction of the ship's course may be changed by altering the line or curvature of the channels through which the water is driven out.

[Printed, 4*d.* No Drawings.]

A.D. 1866, November 15.—N° 2998.

HUMPHRYS, Edward.—(*Provisional protection only.*)—" Im-" provements in machinery used in propelling vessels."

"This invention has for its object improvements in machinery " used in propelling vessels, and the improvements are applicable " to vessels propelled by water received into and forced from " centrifugal or other suitable pumps actuated by condensing " steam engines on board such vessels.

"The invention consists in so arranging the surface condensers " of such steam engines that the water (or such part thereof as " may be desired), which is received into and propelled from the " pumping machinery, may in its passage into or from such " pumping machinery pass through the surface condensers of the " steam engine, and thus economize the power requisite for " causing water to flow through the surface condensers of the " steam engines employed.

"To ensure draughts to the furnaces of the boilers of such " steam engines, a blowing fan is applied on the same shaft " as that on which the centrifugal pump is fixed."

[Printed, 4*d.* No Drawings.]

A.D. 1866, November 19.—N° 3032. (* *)

SIMPSON, Cortland Herbert.—(*Provisional protection only.*) —This invention relates to steam engines combined with a wheel

For propelling vessels, which consists of a rotating cylindrical drum, furnished with movable radiating paddle blades, which are projected from the periphery during a certain portion of the revolution, to act upon the external water. Instead of transmitting power to the axis in the ordinary way, the engine and propelling cylinder or drum wheel are combined, a steam cylinder and piston being furnished to actuate each paddle blade. The bottom ends of these steam cylinders, which are circumposed round a central tube, abut against the tube, which receives a fixed hollow axis, whereon the propeller wheel revolves. This axis contains separate passages for the induction and eduction of the steam; it projects from each side of the propelling wheel, which it supports by resting in suitable bearings. The induction of the steam and the exhausts are arranged to take place when the respective steam passages out of the central axis, as the propelling wheel revolves, are brought to correspond with the inlet ports into the cylinders, and the exhaust is managed in the same way, the paddle blades being by turns projected during one fourth of the revolution, and retired during the remainder. The projection of the blades by the steam power rotates the propelling wheel, and the wheel propels the vessel. Part of the apparatus may be used to condense the exhaust steam, or an ordinary condenser may be contiguously placed in communication with the eduction pipe.

[Printed, *4d.* No Drawings.]

A.D. 1866, November 29.—N° 3139.

HUGHES, Edward.—"Improvements in machinery or apparatus for exhausting and forcing air and gases and for propelling vessels."

"The propeller and chamber enclosing it are entirely immersed in the water, the lower half of the chamber being fixed to an open square chest or tube reaching from one end of the vessel to the other, which chest or tube can be closed or shut with gates or slides placed at both ends of the said chest or tube, so that when the propeller is not in motion the tube can be emptied and the propeller exposed for examination or repair by removing the upper part of the chest or tube where the propeller is set and the upper half or cover of the chamber enclosing the propeller. The pedestals for the shaft are supported on two oblong horizontal plates connected to

" narrow standards fixed to the bottom of the chest or tube, " and at the four ends of each plate there are top flanges to " which are rivetted metal plates forming a box or case extending " to the upper part of the chest or tube and rivetted to it, there " being an opening in the chest or tube leading to the interior of " each box or case, which openings are covered or closed as " required. The plates near the ends of the propeller have " openings for the shaft to pass through, and stuffing boxes are " employed for preventing the water from passing to the boxes " and bearings, and as the boxes are made sufficiently large for a " man to move up and down in them, the bearings can be " lubricated, the packings adjusted, and repairs performed without any difficulty. One mode of turning the propeller is to " fix on its shaft a bevil wheel gearing into a bevil wheel on a " vertical shaft passing through the top of the chest or tube to " the deck above the propeller, and communicating with the " motive power.

" The footstep of the vertical shaft is fixed on one of the " horizontal plates, and the shaft works in the interior of the " water-tight box fixed to the said plate."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, December 6.—N° 3210.

DUNCAN, Robert. — " Improvements in arrangements for " applying auxiliary power to sailing ships."

The ship's boats are fitted with engines and propellers, and are used to tow the ship. The boiler is on board the ship, and steam is supplied to the engines by a tube. The propeller in the boat may also be worked by hand, by means of a spur wheel on the shaft. The boiler in the ship may be used as a condenser for fresh water or for other purposes.

[Printed, 10*d*. Drawing.].

A.D. 1866, December 6.—N° 3219.

PHIPPS, George Henry. — (*Provisional protection only.*) — " Improvements in the means employed for propelling, steering, " and manœuvering vessels, ships, boats, and other navigable " bodies."

The invention "consists in the combination in one and the " same vessel or navigable body of two distinct systems of " propulsion, one of which is the known system under which "water is continually taken into and ejected from the interior of "the vessel," which is termed "the emissive system, while the "other system may be either that of the screw propeller or that "of the paddle wheel."

"The emissive system employed, as also the construction of "the screw propeller or paddle wheel, and the respective "machinery for working the same may be of any known "arrangement."

[Printed, 4d. No Drawings.]

A.D. 1866, December 7.—N° 3233.

SAMUELSON, Carl Erik.—"Improvements in apparatus for "propelling vessels."

"This invention has for its object improvements in apparatus "for propelling vessels. In order to propel by steam power a "passage is formed through the vessel from end to end. This "passage is, by preference, of an oblong section, the breadth "considerably exceeding the depth, and it communicates with "the external water at either end. Around this passage, at a "convenient point in its length, an annular space is enclosed, to "which steam from a steam boiler is admitted, and at the top "and bottom of this space the partitions which separate the "steam space from the passage are in part moveable and turn "on centres, so that they act as valves, and the steam may be "allowed to escape from the steam space into the passage by "moving these partitions or valves on their centres. The steam "so escaping is directed by the partitions or valves so as to flow "in the direction of the length of the passage; in this way a "rapid current of water is established through the passage, and "so the vessel is propelled. A second annular steam space, "similarly provided with moveable partitions or valves, is also "provided for propelling the vessel astern. The current of "water from the passage may be discharged either below or "above the surface of the external water and by one or more "apertures."

[Printed, 10*d*. Drawing.]

A.D. 1866, December 12.—N° 3262. (* *)

BOYMAN, Richard Boyman.—This invention relates to the propulsion, by means of jets of high-pressure steam, of sea-going vessels and aerial conveyances.

" narrow standards fixed to the
" and at the four ends of each plat
" which are rivetted metal plates form
" to the upper part of the chest or t
" being an opening in the chest or t
" each box or case, which openin
" required. The plates near the
" openings for the shaft to pass thr
" employed for preventing the wa
" and bearings, and as the boxes ar
" man to move up and down i
" lubricated, the packings adjusted
" out any difficulty. One mode o
" fix on its shaft a bevil wheel g
" vertical shaft passing through t
" the deck above the propeller,
" motive power.

" The footstep of the vertical
" horizontal plates, and the sh
" water-tight box fixed to the s

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1866, Decem

DUNCAN, ROBERT. — " Imp
" applying auxiliary power to s

The ship's boats are fitted w
used to tow the ship. The
steam is supplied to the engin
boat may also be worked by h
the shaft. The boiler in the s
fresh water or for other purpo

[Printed, 10*d.* Drawing.].

A.D. 1866, De

PHIPPS, GEORGE HENRY.
" Improvements in the means
" and manœuvering vessels
" bodies."

The invention " consists i
" same vessel or navigabl
" propulsion, one of whi

apparatus is so
below the water
running under
of steam donkey
lines of the
not, by dragging
's progress. The
upon the water
side of the vessel.
tube or case,
; to each tube are
fore end for driving
each case for backing
to the steam pipes,
tubes or frustums of
one a short distance
the steam pipes are bent
the full impulsive force of
frustum, whereby (it is
to enter, and is forced
by reacting in proportion to
end of the case, causes
pipes are fitted upon
going ahead, the mouth-
may be drawn within the
condensation of the steam
filling the interspace with

manner of contracting or
of a marine propelling
of prior letters patent,
May 29th, 1866, No. 1497
May 10th, 1860, No. 1155, are

15.—N° 3295.
Improvements in apparatus for

propelling of vessels by means of
which comprises one or

" more centrifugal fans or pumps arranged in a novel and " peculiar manner, each fan being in a casing, in communication " with which there are two passages or ducts leading one to the " bow and the other to the stern of the vessel. The fan is upon " a shaft disposed horizontally, or in any other convenient position, and is driven always in one direction by means of any " convenient kind of steam engine, which may be of the simplest " construction, and which does not require reversing gear.

" The principal feature in the improved arrangement is the " altering of the direction in which the water is propelled along " the ducts by changing the position of the fan in the casing. " There is in the casing a diaphragm or partition, the inner edge " of which is just cleared by the fan, and the ducts or passages " communicating with the bow and stern respectively, open into " the circumferential parts of the casing on the opposite sides of " the diaphragm. The fan is shifted by moving its shaft in the " direction of its axis; and when the fan has its circumferential " openings to that side of the diaphragm which is in communication with the stern, duct, or passage, the water will be forced " out by that duct and drawn in by the other, and the vessel " will be propelled ahead. When the fan is shifted to the other " side of the diaphragm the action will be reversed, whilst if the " fan is in its middle position, the water will move in circles by " the eye and circumference on each side, and the ship will not " be propelled in either direction, although the engines may be " working at full speed. The fan has an open central eye on " each face, but the movement which brings the circumferential " openings to one side of the diaphragm in the casing, causes " the eye of that face to be closed against the side of the casing, " whilst the eye of the other face is drawn away from the other " side of the casing, and the water has thus free access by it into " the fan."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1866, December 20.—N° 3344.

GEDGE, William Edward.—(*A communication from Auguste Chenille.*)—" Improved locomotive machinery or apparatus working without the aid of steam."

A lever has one end attached to the crank of a fly wheel and the other to a connecting rod which is drawn down by a strong

In regard to marine navigation; a set of the a
affixed at both sides to the bilge of the vessel b
line, that when fair winds prevail and the ship is
canvas alone, each set can, by means of a pair of
engines, be converged or drawn within the contou
ship, so that under such circumstances they may no
against the water, impede or obstruct the vessel's
power or impulsive force of the steam is directed
through suitable pipes, which pass out at each side
The apparatus consists of a horizontal rectangular
permanently fitted to each side of the vessel; to
fitted two moveable mouth-pieces, one at the fore e
ahead, and the other at the after end of each ca
astern. These mouth-pieces are connected to th
and consist of a series of bell-mouthed tubes o
progressive sizes, concentrically arranged one a
within another. The extreme ends of the steam
round to a right angle, so as to direct the full im
the steam jet into the central or smallest frustu
stated) a current of water is induced to ente
through the horizontal case, which by reacting
its velocity upon the water at the after end o
the propulsion of the vessel. The steam pip
the telescopic slide principle, so that when going
piece which effects the stern movement may b
vessel. Provision for preventing the conden
in the pipes, is made by incasing and filling
sawdust.

An improvement is made in the manne
converging, by means of cams, the floats of
wheel, described in the Specification of
granted to this inventor and dated May
and his other letters patent dated May 10t
referred to.

[Printed, 4s. 10d. Drawings.]

A.D. 1866, December 15.—
RANDOLPH, CHARLES. — "Improve
" propelling vessels."

The invention "relates to the propellin
" improved and simplified apparatus,

" tube or tubes being open at both ends so that the water may " pass freely through."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 28.—N° 3406.

MAKINSON, Alexander Woodlands. — " Improvements " in locomotive and marine engines."

The object of the invention is to reduce the amount of slip of the paddle wheels (in the case of marine engines), to give greater quickness in starting, and to avoid waste of power. A shaft conveying a pinion is driven "by contact with" "the paddle " wheel." On this shaft is fixed a wheel "having a greater " annular velocity" than the paddle wheel. This wheel reduces the amount of slip. A second wheel, with an angular velocity greater still, may be driven from the shaft, and so further reduce the amount of slip.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, December 28.—N° 3407.

STOREY, Edward.—(*Provisional protection only*.)—" Improve- " ments in marine, locomotive, stationary, and other steam " boilers."

" The object of this invention is an economy of heat in the " generation of steam by checking loss by radiation, and heating " the feed water by surplus of waste heat, and it is applicable to " tubular and other boilers, and dispenses with brickwork used " in stationary steam boilers, besides giving other advantages. " It consists in enclosing or enveloping the steam boiler with " a double casing filled with water when in use, there being a " flue space left between the boiler and the casing for the heated " gases to pass through before entering the chimney, consequently " the exterior of the boiler will be kept heated by the surplus " heat of the gases after passing through the internal flues, and " a portion of the residue of the heat will pass to the water " contained in the casing. The feed water for the boiler is made " to enter the casing first, and is pumped from the casing into " the boiler. The casing need only be made for atmospheric " pressure, though if required it may be made to resist pressure " above the atmospheric pressure."

[Printed, 4*d*. No Drawings.]

—N° 2341.

new method of creating a
and reducing labour by
or without condensation,
strength is required.”
ater wheel is mounted on an
lled with water to the level of
A fire is kindled below, and
the buckets of the wheel, and
us obtained may be used for

apparatus is described. “It
eam from the top of the boiler
o condense the same, placed
aid steam shall return back into
A valve at the end of the pipe
e boiler through it. Ether or
ace of water.

ust 30.—N° 2964.

A new system of naval archi-

ribed in the specification is an oar
ce or in two pieces, and has “its
ular to the plain of the loom.” It
red. “The best mode of working
e bolt through the loom, and row
can be used for either side, only
the thowle, so that the aftermost

Rolls Chapel Reports, 7th Report, p. 192.]

ember 10.—N° 4612.

arious improvements in the ma-
s, and in vessels so propelled.”

A.D. 1822, June 26.—N° 4683. (* *)

BRUNEL, MARC ISAMBARD.—Marine engine. Two cylinders are placed inclined to the horizon, and at a right angle to each other, and act on a double crank, so as to apply their powers in the most direct way for producing a rotary motion. The parallel movement of the piston rod is directed by "guide rollers" moving between two parallel "straight edges," and the weight of the piston, in its inclined position, is relieved by "spring supporters" at the extremities of the head beam. The motion is regulated by an hydraulic apparatus, consisting of a pump, which forces the water through an orifice, that may be enlarged or contracted by a governor acting on a plug, moved so as not to close the orifice entirely, but to allow a "waste" equal to about $\frac{1}{80}$ of the orifice, to avoid shocks by its sudden closing; to facilitate the action of the plug under all degrees of pressure, it is connected with a small piston, the hollow stem of which allows a portion of the forced fluid to escape through it upon the back of the piston: thus balanced between two equal pressures, the plug is easily acted upon by the governor.

A modification is described of the common governor, which will act regularly at sea. A spiral spring employed as a substitute for gravitation closes the orifice when the revolving balls are extended, and counteracts the power of the engine.

There being perfect command of the power of the engine, by means of the "moderator" or plug, the paddle wheel shafts may be connected or disconnected at pleasure by the usual means, and the engine be allowed to work out the steam as it happens to be generated.

The boiler is a cylindrical vessel with hemispherical ends. In the middle of its length and without cutting out the metal at that place, but merely perforating it with small holes, a cylindrical steam room is raised to the required height, and the steam rises through the holes into its cavity. "The cylindrical body of the boiler is to be kept entirely full of water, and if there be but one steam room there will be very little agitation of the water when at sea."

At the bottom of a hopper-shaped cavity a cast-iron cylinder that has cavities filled with sea coal revolves on an axis. In the revolution of the cylinder the cavities are brought opposite corresponding orifices in a "feeding cylinder" beneath it, through which the coals fall and are distributed on the fire grate.

The condenser is formed of an assemblage of main or large pipes, which collectively form a spacious chamber. They have smaller pipes connected with them, and the whole is placed in an iron reservoir, replenished with cold water by a pump at every stroke of the engine. Fresh water only is used for the generation of the steam. The whole vapour being condensed without mixing with the condensing water, the use of sea water is avoided.

The common condenser and air pump are adapted to this engine, and the "moderator" is applied to existing boat engines.

[Printed, 1*s*. 6*d*. Drawings. *See* London Journal (*Newton's*), vol. 5, p. 118; Register of Arts and Sciences, vol. 4, p. 237.]

A.D. 1825, September 15.—N° 5251.

TEISSIER, Jean Antoine.—(*A communication.*)—"Improvements in steam engines."

The first part of this invention relates to a boiler "adapted for steam engines for navigation." It is constructed with four distinct furnaces, each capable of being separated for cleaning or repair without interfering with the action of the rest. Each furnace consists of a series of tubes formed into "a sort of cylindrical cage, within which the fire is made." These tubes all communicate with one another and with a larger tube at the top common to all four furnaces. The walls separating the furnaces are double and admit of water being contained within them, the top is formed in the same way. All these tubes and divisions communicating together, the water has free passage throughout, and by being thus thinly spread out, and extended over a larger surface, is better exposed to the action of the heat.

The second part of the invention refers to a similar boiler, of smaller size, and adapted for stationary engines.

The third part relates to a boiler constructed so as to prevent the deposition of salt upon its bottom. The roof of the furnace is gable-shaped, so that the salt may not lodge on it, but may fall off into receptacles provided at the side of, but lower than, the furnace. The flue is led three times along the boiler, backwards and forwards, but the sides of it which the water touches are constructed of an angle sufficient to throw off the salt. A row of tubes passes from the boiler through the centre of the furnace, and their lower ends lead to the receptacle for salt.

The fourth part consists of "a steam engine suitable for steam *boats*." In it the alternate reciprocating motion of the piston is changed to a continuous circular motion as follows:—To the upper end of the piston is fixed a cross bar. This cross bar carries rods which work parallel with the piston-rod, one on each side of the cylinder. Each of these rods is jointed to the corner of a triangular lever. This triangle is hinged at one corner and connected at its third corner to a crank on the axis of the paddle wheels.

[Printed, 1*s*. 8*d*. Drawings. *See* Repertory of Arts, vol. 2 (*third series*), p. 334; London Journal (*Newton's*), vol. 13, p. 247.]

A.D. 1827, January 11.—N° 5447. (* *)

FRASER, James.—Marine boiler. The bottom, sides, and top of a boiler are surrounded with a case about 3 inches in width, containing water, and the smoke-flue carried between the case and the boiler. Internal flues run from front to back, and descend, in the return, under the concave bottom of the boiler. The whole heat from the interior of the flues, instead of passing direct into the shaft, thus acts on the boiler surface, without injuring the timbers of the ship. "The case would materially weaken the "force of any explosion." A partition is made in the middle of the case, to prevent the "sway of water."

[Printed, 4*d*. No Drawings. *See* Repertory of Arts (*third series*), vol. 8, p. 527; London Journal (*Newton's, second series*), vol. 1, p. 337.]

A.D. 1829, January 14.—N° 5757. (* *)

UDNY, John.—Expansion engine. The inventor introduces three cylinders, two of which are of half the size of the third or expansion cylinder. The two small or "first action cylinders" have each a valve opening to the boiler, and a valve opening to the upper and under side of the piston of the large cylinder, which has valves that open each face of its piston to the condenser. The condenser, valves, pumps, governor, and fly wheel are similar to those in other engines; the piston rods are attached to the same working beam, and the three pistons rise and fall together.

The steam that is admitted into one of the first action cylinders, after it has moved its piston, flows into the large cylinder, and in expanding rises or depresses its piston, as it may be adjusted towards the vacuum on its opposite face; the valves being reversed, the steam from the boiler enters the other "first action

" cylinder," and presses the piston forwards to its limit; then flows into the large cylinder, and expanding carries the piston to the limit of its stroke, towards the vacuum on its opposite side; the piston of the other first action cylinder being meanwhile moved into a position to commence another stroke. " The steam " is thus continually flowing into one or other of the small " cylinders, and upon a side of the expansion cylinder piston, and " into the condenser, and never counterpresses on the pistons of " the small cylinders while expanding."

Steam of any pressure may be used, and the first action cylinders bear different proportions to the expansion cylinder.

The engine may be used with two condensers, or by high pressure steam without a condenser. The equilibrium of pressure may be produced in the return stroke of the smaller cylinders by a valve in the piston.

The ill effects arising from the pitching of a vessel at sea, in giving motion to the water contained in a boiler, are prevented by a pipe open at both ends running from one end or side of the boiler over its top to the opposite side.

[Printed, 8*d.* Drawing. *See* Register of Arts and Sciences (*new series*), vol. 3, pp. 273, 389, 312, 313, and 345; vol. 7, p. 193.]

A.D. 1831, April 14.—N° 6106.

BRUNTON, THOMAS.—(*A communication.*)—" An improvement " in certain apparatus, rendering the same applicable to steam " engines."

Steam boilers are constructed with vertical divisions. Between each pair of these divisions curved bars are rivetted in such a manner as to cause the water to flow backwards and forwards instead of straight upwards or downwards, a winding passage being formed by the bars. The upper portion of the boiler is not divided. On the application of heat, rapid currents are created by the action of the " heating chambers " formed as above described, and the heat rapidly distributed throughout every part of the boiler. These chambers are also easy to clean. A boiler suitable for a steam-boat is shown in one of the drawings. It is constructed as above described, but has also a space for water below the ashpit.

[Printed, 1*s.* 4*d.* Drawings. *See* London Journal (*Newton's*), vol. 9 (*conjoined series*), p. 214; Register of Arts and Sciences, vol. 6 (*new series*), p. 258.]

A.D. 1831, ... N° 6106.*

BRUNTON, Thomas.—On April 25, A.D. 1836, John Stephens and Augustus Manning having obtained by assignment Thomas Brunton's patent, No. 6106, entered a memorandum of alterations, in which the words "called boilers" were added to the title after the word "apparatus." Certain verbal alterations for the sake of greater clearness were also made, and it was claimed that the currents generated in the boiler would prevent incrustation.

[Printed, 4*d.* No Drawings.]

A.D. 1833, January 29.—N° 6378.

LINTON, John. — "An improved construction of steam "boiler."

The invention consists in placing a series of four sided flues within the boiler case "so as to form a number of narrow and "comparatively deep vertical, with shallow and comparatively "broad horizontal, channels or spaces between, above, and below "the flues, for the water of the boilet to flow into." By this means a greater extent of heating surface is obtained. One of the figures shows a pair of the boilers "put together, as they "would be used for steam navigation."

[Printed, 10*d.* Drawing. *See* Repertory of Arts, vol. 1 (*new series*), p. 24; London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 376.]

A.D. 1833, October 7.—N° 6482. (* *)

MAUDSLAY, Joseph.—Boiler. The square "fire-box" has a wagonhead, and on the top and sides is surrounded with a sheet of water. A series of horizontal cylinders (the drawing shows nine) are arranged one within the other. The space between every two adjacent cylinders is enclosed at each end, and forms an annular cylindrical chamber. The central cylinder is also enclosed at each end. The annular chambers are placed from 1½ to 2 inches apart, and "a little eccentrically to each other." The interspaces form flue passages, having one end opening into a side of the fire-box, above the burning fuel, and the opposite ends into a space at the bottom of the vertical chimney. The water to feed the cylindrical chambers is drawn from the central cylinder, and from small pipes inserted into the lower part of each annular chamber. The water is thus disposed in thin and nearly concentric layers between the currents of flame and gas passing through the flue passages towards the chimney. On the upper side of each cylindrical chamber is a manhole. The openings placed over each other connect the waterspaces, and allow a free communication to the fluid throughout the chambers, and a passage for the steam to ascend into the "steam head," which is placed at a height sufficient to insure the water not boiling over. The parts of the smoke flues crossed have "filling rings" interposed between each pair of cylinders, to prevent the escape of steam or gas.

The boiler is applicable for steam vessels navigating shallow waters, and drawing small depth of water, and will form "a sub-" "stitute for the small internal tubes used in locomotive engines" "for horizontal flue passages, which by their rapid destruction" "occasion great expense and loss of work."

[Printed, 10*d.* Drawing. *See* London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 379.]

A.D. 1837, April 4.—N° 7334.

LAURAS, Michael Berand. — "Improvements in steam" "navigation."

[No Specification enrolled.]

A.D. 1837, August 24.—N° 7422.

HEARN, William, and DAVIES, William.—"Improvements" "in the construction of boilers for the generation of steam."

Metal tubes are secured at one end of the boiler, either directly to the boiler or to a metal box rivetted to it and opening into it. These tubes descend from below the level of the water in the boiler, and pass underneath it through the fire-place; they then ascend and re-enter the end or side of the boiler above the water level. By this means a rapid circulation of the water is induced. Opposite and sloping diagonally over the mouth of the inlet pipe, is a plate against which the water may strike, and thus be driven downwards into the water in the boiler, instead of its mixing with the steam.

One of the figures shows a marine boiler composed of six boilers arranged side by side.

The remainder of the specification treats of matters unconnected with this series.

[Printed, 10*d.* Drawing. *See* Mechanics' Magazine, vol. 31, p. 1.]

A.D. 1837, October 14.—N° 7445. (* *)

RIGEL, ANTONIN PIEUX. — “ Improvements in steam engines.” The paddle wheels as well as the rudder of a steam boat are brought under the control of the steersman, so that both wheels may be used for the purpose of steerage, as well as for a propelling power. Various means for effecting this may be employed.

[Printed, 1*s*. Drawings. *See* London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 103; Mechanics' Magazine, vol. 32, p. 757.]

A.D. 1837, November 11.—N° 7467. (* *)

SLATER, JAMES.—“ Improvements in steam engines, and also “ in boilers and in furnaces used for the generation of steam or “ other useful purposes.”

The engine is constructed with two cylinders. Into the first the steam is admitted at high pressure. On its exit from the cylinder, after moving the piston, it enters into an intermediate vessel or steam chamber, which acts as an independent low-pressure boiler, and expanding therein is admitted into the second cylinder, and moves its piston, and is thence discharged into the condenser.

A compensating valve is formed like a common steelyard valve, having the plug conical, and opening upwards, and is placed in a valve box, between the intermediate vessel and the boiler. The greater pressure of the steam acts upwards on the smaller surface of the valve, and the lesser pressure of the steam acts downwards on the greater surface of the valve, so that the valve will rise and fall until the pressure is compensated, and each cylinder enabled to work at its full power as a distinct engine, each being, as it were, furnished with its own boiler. The valve adjusts the difference arising from the irregular generation of the steam, or from the diameters of the high and low-pressure cylinders, “ and keeps the steam in the intermediate vessel at the “ required pressure when the engines are standing, or in readi-“ ness to start, so that both may work at full power.”

The parts of a boat engine with the compensating valve introduced are shewn.

An apparatus is described by which high-pressure tubular locomotive boilers may be applied to stationary or marine engines. A float chamber is attached to the boiler, and a proper receptacle is formed at the bottom to receive the deposit. A self-acting valve rises and allows the heavier (salter) part of the water to run off, which clears the compartment. Where the sediment is considerable, a horizontal bar is slidden backward and forward, and gives an oscillating movement to an agitator that mixes the sediment with the water which escapes through a valve.

In the furnace the feeding hopper is divided from the fire chamber by a brick arch. The bars forming the hopper bottom may be removed by withdrawing a catchpiece. The grate bars are placed slanting (at an angle of about 45°), and the triangular space beneath them forms an air chest from which heated air is conducted among the fuel. "To create a draft through the fur-" "nace, when the engine is standing, a jet of steam is conveyed" "into the chimney."

[Printed, 2*s.* 4*d.* Drawings.]

A.D. 1838, January 20.—N° 7547.

ADOR, Ambroise.—" Improvements in producing or obtaining " motive power."

The engine is figured and described as applied to the propulsion of a ship. A receiver of lead or other non-corrosible metal is filled with sulphuric or other suitable acid and water. Within it suspended a vessel containing pieces of zinc, iron, or other metal such that when it is subjected to the action of the acid, hydrogen gas is evolved. The gas passes by a pipe to another vessel, into which it is admitted by a valve, thence it passes through two valves into a chamber containing platina. In this chamber combustion takes place, and the gas is suddenly expanded. Its expansion closes the valve by which it entered. The various chambers are all fitted with suitable pressure gauges and safety valves. The force generated may be applied in any convenient manner, but the inventor prefers to use a rotatory engine like a "Barker's mill." In it the gas is permitted to flow through radiating arms, mounted on an axle, having their extremities curved, so that the reaction of the gas as it issues from the extremities revolves the apparatus. A double set of arms is provided, one set with the arms curved in one direction, the other in the opposite direction, and the gas can be admitted to either, so that the engine may be revolved in either direction.

[Printed, 1*s.* 4*d.* Drawings. *See* Repertory of Arts, vol. 10 (*new series*), p. 153.]

A.D. 1838, May 21.—N° 7646. (* *)

SEAWARD, Samuel.—A marine engine "worked by the alter-" "nate action of the steam and atmosphere on opposite sides of

“ the piston.” Its efficiency greatly depends on a peculiarity in the construction of the piston. Three grooves are sunk in its outer circumference; the upper and undermost are filled with packing. One of the guide rods which steady the piston is formed hollow; within this is another tube which works in a stuffing box and communicates at one end with the boiler, and supplies steam to the middle groove in the piston; this vapour having a greater pressure than the air renders the joint formed by the sliding contact of the curved surfaces steam-tight.

An apparatus is described to ascertain at sight the density or degree of saturation of the water in the boiler. A glass tube closed with a cock at top and bottom, and about 14 inches long and ¾ inch bore, is fixed on the boiler. Another cock is fixed on the side of the tube near the top, and a similar cock also on its side near the bottom, and to the latter is attached a pipe that reaches nearly to the bottom of the boiler. On opening the two side cocks the water rises from the bottom of the boiler into the glass tube, and stands at the level of that in the boiler. The two side cocks are then closed, and the cock on the upper end of the glass tube opened. A hollow ball graduated a degree higher in density than the water it is to be maintained at, is dropped into the tube, wherein it sinks to the bottom. A like ball graduated a degree lower in density is also dropped into the tube and floats on the surface of the water; the end cock is then closed, and the two side cocks are opened. As the water increases in density, the lower ball rises in the tube, and as it decreases the upper ball sinks. When the water has increased beyond the limited density, the pressure of the steam is applied to force the supersaturated fluid up a pipe into an iron vessel, placed over the boiler, from which it is discharged into the sea, and a fresh supply of feed water is meanwhile forced into the boiler, and saline depositions are prevented.

In a Disclaimer, enrolled November 20, 1838, the inventor disclaims the application of his improvements to any but marine engines.

[Printed, 10*d*. Drawing. *See* Mechanics' Magazine, vol. 29, p. 8; also vol. 28, p. 369; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 176.]

A.D. 1838, July 30.—N° 7754. (* *)

HALL, Samuel.—“ Improvements in steam engines, heating or “ evaporating fluids or gases and generating steam or vapours.”

A portion of air is introduced on each side of the pistons of the cold water pumps of a steam engine, wherein condensation is effected by contact with metallic surfaces, to prevent by its elastacity any blow or unpleasantness in the working of the pump arising from the want of elasticity in the water.

A self-acting apparatus is described for changing the water in stills or boilers when it has become too strongly impregnated with saline or other matters. A float attached to a rod is counterbalanced, so as to remain at rest when the specific gravity of the fluid is not too great, but to rise when the specific gravity increases and open a valve, which allows the saturated fluid to be pumped out of the boiler, and as the water is lowered in this vessel to permit the descent of water of less specific gravity to supply its place.

In a boiler for a marine engine, four fire-places are formed in the width of the boiler and extend its whole length. In the roof of each fire-place four conical smoke flues are set vertically, and open at their upper ends into a horizontal flue within the boiler which leads into the chimney. The ash-pit and fire-chamber are on three sides in contact with the water, and the conical flues are immersed in it.

A modification of the preceding boiler is given. A number of small vertical tubes set at a small distance from each other, and open at both ends to the boiler, pass through the horizontal tube. The hot gases from the conical flues circulate among them on their way to the chimney, and the steam generated is received in a " steam chest " placed over the horizontal tube.

The method is applied to a range of conical flues where the height is not sufficient for the long conical flues. The heated gases pass from one range into the other.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1839, April 23.—N° 8045. (* *)

GALLOWAY, ELIJAH.—Marine engine.

The cylinders are placed at right angles to the paddle shaft. " The novelty principally consists in the use of a lever which " causes the action of the two engines to be brought upon one " pair of cranks. The pistons have a motion with respect to " each other, nearly coinciding with the pistons of two ordinary " marine engines, acting upon cranks placed at right angles to " *each* other."

A rotary engine is described. The piston is circular, and suspended on two axes or rods, which have ball and socket motions at both ends; the barrel is suspended on axes, and connected by a ball and socket joint to the fly-wheel shaft, and works at an angle of 30° to the horizontal shaft. "When the engine and shaft revolve, " the piston has a vibrating motion on its axis, as regards the " barrel, but any point on it will perform a true circle round " the common centre."

[Printed, 6*d*. Drawing. *See* Inventors' Advocate, vol. 1, p. 68.]

A.D. 1839, December 16.—N° 8312.

BRAZILL, JACOB.—" Improvements in obtaining motive power."

A drum fitted with radial plates is mounted on a vertical axis. It is revolved by currents of air from two bellows, which infringe upon the plates. Motion is communicated to the bellows by rods from a crank shaft which derives motion from the axis of the drum. A handle is provided, by which the machine may be started, after which it works itself. The radial plates are broader at the periphery than near the axle of the drum. Instead of bellows, " an ordinary blowing machine " may be employed.

[Printed 10*d*. Drawing. *See* Inventor's Advocate, vol. 2, p. 419.]

A.D. 1841, September 8.—N° 9072. (* *)

FAIRBAIRN, WILLIAM.—" Improvements in the construction " and arrangement of steam engines."

The working parts of marine steam engines are so arranged as to render them more compact. Two vibrating levers are mounted in bearings in the framework. One end of the levers is connected to the crosshead which works the pistons of the air and force pumps, the other end is connected to such a point as will make a true parallel motion of the vibrating levers, one end of which is connected to the lower end of pendant rocking levers, and the other end to the crosshead by which the connecting rod is attached to the piston rod.

[Printed, 1*s*. 2*d*. Drawings. *See* London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 321.]

A.D. 1841, October 21.—N° 9125.

JONES, THOMAS.—" Improvements in the construction and " arrangement of certain parts of marine and stationary steam " engines."

[No Specification enrolled.]

INE PROPULSION.

December 9.—N° 9553. (* *

Moses.—"Improvements in steam
and in motive machinery connected there-

ratus is formed of corrugated plates. To
condensers is added an air pump to draw off
vapour, and a separate pump to draw off
densation. The top of the air pump and top
a cold water pump. In engines having
a double acting air pump is employed by
condensation and injection water are pumped
valves, the air and vapour by the top valves.
the pressure of steam is shewn. In these
be cut off in the small cylinder at any part of
two of these boilers are applied to marine
steam chamber of communication is used.
for transmitting power to the crank are
cylinders.
is described in which a small cylinder is worked

used having a reciprocating motion and the
air pump placed in the inside of the working

at the stern of vessels are driven by three
so that the piston of one small make twice the
in the same time as either of the other pistons.
"key" the crank of a marine engine is discon-
paddle shaft. A separate slide valve is used to
ulated by another valve. The eccentrics of one
on the crank so as to work the valves of the

valves are worked without requiring reversing
A cam on the crank shaft acts on two rollers
terminates in a rod connected to a lever on the

are described of supporting main plummer
or pistons is formed of two rings, one of cast
iron secured to each other; their unequal
to press outwards in the common piston
annular piston. A cock and plug for a steam
brake is described for preventing cams working

valves from turning round with the shaft till the stop on the shaft comes to its proper position.

"Wedge slide valves" are described.

[Printed, 1*s.* 10*d.* Drawings. *See* Mechanics' Magazine, vol. 39, p. 49, and vol. 39, pp. 104 and 161; Engineers' and Architects' Journal, vol. 6, pp. 396 and 468.]

A.D. 1843, April 19.—N° 9700.

BYROM, James, — "An improved system of connexion for "working the cranks of what are commonly called direct action "steam engines."

"The invention consists in connecting, by means of a two-"armed cross head (working over an ordinary four-armed cross "head of a direct action steam engine), the side crank rods "which ordinarily act each upon a separate pair of cranks, and "thus causing them both to act upon one pair of cranks, thereby "reducing the number of cranks upon the crank shaft, and con-"centrating the power of the engine."

The drawings show a pair of marine engines with the improvement applied to them.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1843, May 30.—N° 9749.

NEWTON, William Edward.—(*A communication.*)—"Im-"provements in the method or system of constructing boats and "other vessels."

A vessel is described, which consists of a cylinder or drum, made of sheet iron. Round the inside circumference of the cylinder are rails, upon which a locomotive runs. The locomotive, by a movement "similar to a squirrel's in its cage," makes the boat revolve. The drum has paddles on the outside, which act on the water as the boat revolves. The plates at the end of the cylinder extend beyond its edge, and so, with the paddles, form chambers which retain the air. This helps to support the vessel. A similar arrangement may be adopted in ordinary paddle wheels.

[Printed, 8*d.* Drawing.]

A.D. 1843, July 1.—N° 9810. (* *)

LUCENA, James Lancaster. — "Improvements in steam "engines and in machinery for propelling vessels, which improve-

" ments were applicable to other purposes, being an extension of " a Patent for the term of five years" granted to Elijah Galloway, July 2, A.D. 1829, No. 5805.

[No Specification enrolled.]

A.D. 1843, September 28.—N° 9885. (* *)

COLLIER, Elisha Haydon.—This invention relates to the construction of furnaces, and the so arranging the flues, that the smoke and unconsumed gaseous and other products of combustion shall, previous to passing off to the chimney, be conducted over a smokeless fire and all their inflammable constituents consumed.

The invention is illustrated and described in its application to a set of marine boilers, combining a series of furnaces. Of these, the central furnace is to be fed with coke, charcoal, or other fuel which emits no smoke, and the flues from all the other furnaces by means of lateral channels converge towards and enter the central furnace at the sides, and being previously commingled and refreshed with supplies of oxygen obtained from incoming currents of atmospheric air, and thereby rendered inflammable, are caused to pass over the incandescent surface of the smokeless fire, where their combustion takes place; hence the hot draught passes into other heating flues which lead through other parts of the series, and thence carry off the products to the chimney.

The chimney is enclosed by a jacket, through which the feed water is caused to pass and become heated before entering the boiler; and according to one plan, the current of fresh air which is mingled with the products of the combustion of the ordinary fuel in the outer furnaces, comes down a separate passage in the chimney and becomes heated therein; the quantity of air so admitted passes through a perforated plate and the supply is regulated by a damper.

[Printed, 1*s.* 2*d.* Drawings. *See* Engineers' and Architects' Journal, vol. 7, p. 152.]

A.D. 1844, March 19.—N° 10,112.

INGLIS, Hugh.—" Improvements upon locomotive steam " engines, whereby a saving of fuel will be effected, which im- " provements are applicable to steam vessels and other purposes, " and to the increasing the adhesion of the wheels of railway

" engines, carriages, and tenders upon the lines of rail when the " same are in a moist state."

[No Specification enrolled.]

A.D. 1844, May 30.—N° 10,205.

DEANE, Charles Anthony.—" Improvements in constructing, propelling, and steering vessels."

[No Specification enrolled.]

A.D. 1844, October 31.—N° 10,372.

BEADON, George.—" Improvements in life-boats or rafts, " and in apparatus for raising or lowering the masts of vessels, " which improvements in raising and lowering are applicable to " other purposes."

The only part of the invention connected with the present series consists of " a split bearing for oars." This is figured in the drawing, but is not described. The rowlock is arched over at the top, and the oar is fastened in it by having secured about it a ring with edges which overlap the rowlock on both sides. This ring is presumably made in two pieces, so that it may be fitted on the oar after the oar has been placed in the rowlock.

[Printed, 10*d.* Drawing.]

A.D. 1844, November 25.—N° 10,404.

REYNOLDS, John William Buckle.—" Improvements in " obtaining motive power for working locomotive carriages and " other machinery."

A considerable part of the Specification is occupied by a description of a pneumatic locomotive, but a description of a method of propelling vessels is also given. In the stern of the vessel is a cylinder, having two pipes opening into it at its inmost end. One of the pipes leads upwards, and discharges above the water-line. The other is in connection with a receiver filled with a mixture of gas and air. This receiver is filled in proper proportions by two pumps of different sizes but worked simultaneously, one of which supplies gas, and the other air. The two pipes leading from the cylinder are fitted with stop cocks. These cocks have lever handles, worked by tappets on a guide rod. In working, the exit pipe is closed, and gas admitted into the cylinder, and fired by a galvanic current. The expansion of the gas drives out the water. The exit pipe is then opened, the residue of gas remaining after firing passes through it and is discharged, and the water rushes in. In a modification, a piston may work in the cylinder, and the gas be fired behind it. In this case the stop-cocks are worked by tappets on the piston rod. Four cylinders are to be used, and the same number in the bows for backing the vessel. The pumps and guide rod for working the stop-cocks may be driven by a small stationary gas engine, in which gas is exploded below a piston to compress air, this air being used "as a "means of pressing such piston into a vacuum obtained by the "explosion of gas."

[Printed, 2*s.* 4*d.* Drawings. *See* Engineers' and Architects' Journal, vol. 8, p. 225.]

A.D. 1845, January 23.—N° 10,493.

BORRIE, Peter.—"Improvements in the construction and "fitting or equipping of ships or vessels."

The greater part of the Specification is occupied with matters not connected with the present series. In the first part a ship is described, in which the stern post may be made with an opening for the propeller to work in. There are also open spaces for ventilation in parts of the ships, from which air may be supplied to the furnaces.

A method of attaching a propeller, so that it can be shipped or unshipped, is described. The shaft of the propeller has a socket into which the end of the engine shaft fits. It is mounted on a frame, which is kept in position by rods worked from the inside of the ship. At the top the frame is hinged, so as to be capable of swinging in a direction at right angles to the keel. To unship the propeller the rods which fix the frame are taken out, the propeller shaft and main shaft disconnected, and the frame swung up to the side of the ship.

[Printed, 1*s.* 10*d.* Drawings. *See* Artizan, vol. 7, p. 73.]

A.D. 1845, October 27.—N° 10,898.

ORTON, Reginald.—"Improvements in life-boats, life buoys, "and apparatus for conveying persons ashore from wrecked or "stranded vessels."

A life-boat is described. It is to be propelled by oars, the blades of which are made of a frame to which are winged flaps, which will admit the water to pass in one direction, but close for the stroke. The flaps are arranged like the strips of a venetian blind.

Or the blade may be made with two flaps like the leaves of a book. At various distances along the loom are "axes," or short pegs.

[Printed, 1*s.* 6*d.* Drawings. *See* Repertory of Arts, vol. 8 (*enlarged series*), p. 129; Mechanics' Magazine, vol. 44, p. 209.]

A.D. 1845, December 10.—N° 11,001.

McNAUGHT, WILLIAM. — "Improvements in the steam "engine."

The improvements consist in "the application of a non-con-"densing cylinder to the kind or description of condensing or "low-pressure beam engines presently used, and attaching or "connecting such cylinder to the opposite end of the working "beam from that on which the condensing cylinder is connected, "thereby causing the steam, after being used in the usual way in "the non-condensing cylinder, to pass into the nozzel of the "condensing cylinder, and there to be used for impelling the "piston of the condensing cylinder, after which it escapes into "the condenser in the usual way."

A marine engine of this sort is shown in the drawing.

[Printed, 10*d.* Drawing. *See* Repertory of Arts, vol. 8 (*enlarged series*), p. 69; Engineers and Architects' Journal, vol. 9, p. 246; Practical Mechanics' Journal, vol. 1, pp. 35 and 152; Artizan, vol. 6, p. 182, and vol. 8, p. 257; Patent Journal, vol. 1, p. 58.]

A.D. 1846, April 15.—N° 11,167.

HAYCRAFT, WILLIAM TUTIN.—"Improvements in steam "engines."

The first part of the improvements consists of a chamber for drying steam. It may be placed either inside or outside the boiler. "Reverberating plates" are arranged alternately from the top and bottom of the chamber, and a drain pipe is provided, to carry off the priming and deposits. The chamber may be cylindrical, and the plates then take the form of concentric cylinders. Various other arrangements of chambers are described, which are to be placed outside the boiler. They have "reverberating plates" of various forms. The inventor claims any chamber formed so as to cause a reverberation of steam and separate the priming. He also claims any chamber with an inlet, an outlet, and a drain pipe, for similar purposes. A case, filled with tubes, open at their ends, through which the steam passes, is used for like purposes. A valve regulates the admission of steam. Or another smaller boiler containing steam at a high pressure may be connected to this "siccator."

The steam may be heated before reaching the "siccator" by passing through a jacket about the cylinder.

An expansion valve is described, which revolves in a "cylin-"drical piece with passages," and has "moveable stops."

An improved condenser is described. It consists of a number of narrow tubes, through which cold water is forced.

A journal for a shaft is made of a ring having internal grooves which fit into similar rings cut on the shaft. This may be employed for propeller shafts.

Fire-bars are made to revolve continually in the same direction, either by screws or otherwise, to carry the fuel to the back of the furnace.

For filtering water, a cell of porous stone is fixed in the delivery pipe, or in a chamber connected with the delivery pipe.

[Printed, 8*d*. Drawing. *See* Patent Journal, vol. 1, p. [illegible].]

A.D. 1846, December 3.—Nº 11,473.

CRADDOCK, THOMAS.—"Improvements in steam engines and "boilers, and in machinery connected therewith."

This specification describes with considerable minuteness a double-cylinder, high-pressure engine, and its adaptation to "the "working, by direct action, of screw and other submarine pro-"pellers." The engine with the necessary modifications is de-"scribed as follows:—The two cylinders are "set at such an "angle in respect of one another as that two lines drawn through "the centres of the cylinders respectively shall meet in the centre "of the main shaft on which the crank is fixed." The piston rods are connected by cross-heads and connecting rods with one crank pin. The air pump and boiler pump are both worked by a lever beam from the cross-head of the connecting rod of the piston of the low-pressure cylinder. The boiler is composed of a number of vertical water tubes uniformly curved to allow for expansion and contraction, ranged in four quadrangles about the furnace. Caps, which can be screwed off from the ends of the bottom cases, admit of sediment being removed. The condenser is placed within a cistern on the floor of the vessel. The steam is introduced into "a multitude of revolving tubes of small diameter and "the condensation is effected by external application of cold air "or water to these tubes." Instead of a rotatory, a vibratory or other motion may be employed; in the marine engine the condenser receives a vibratory motion from the weigh shaft. The valves are made without a steam-box. They are slide-valves, with a hollow in the face, to throw the steam-pipe alternately into connection with the top and the bottom of the cylinder. A regulating damper is provided to regulate the admission of air to the furnace. An air-vessel is connected with the boiler in such a way that the pressure of air in the vessel is equal to the pressure of steam in the boiler. Equilibrium being attained, this connection is cut off, and another opened through the medium of a cylinder having within it a piston. If the pressure in the boiler increases, this piston is depressed, and it, being connected to the damper by a chain, closes the damper, which lowers the pressure of the steam to a proper working standard. In the land engine the steam chest is placed within the chimney and, in order to avoid priming, the mouth of the steam pipe is carried from the top of the chest, while a pipe below carries off the water. The patentee does not state whether any similar arrangement is to be adopted in his marine engine.

The specification also describes an oscillating engine applied to a pair of paddle wheels. It is in the main on the same principles as the engine described above. The cylinders are set at the same angle. The piston rod of the low-pressure cylinder is connected directly to the crank rod, that of the high-pressure cylinder to the same pin by means of a link. The valves may be either with or without steam boxes. Some modifications of the arrangement of the cylinders are described.

The remainder of the specification refers to the use of these engines for other purposes than that of propelling vessels.

[Printed, 5*s*. 6*d* Drawings. *See* Mechanics' Magazine, vol. 47, pp. 97, 121, 156, 169, and 265, and vol. 48, p. 241; Artizan, vol. 67, p. 158; Patent Journal, vol. 3, p. 55; Engineers' and Architects' Journal, vol. 10, p. 183.]

A.D. 1846, December 21.—N° 11,506. (* *)

POOLE, Moses.—"Improvements in steam engines and in machinery for propelling machinery and fluids."

A drum is fixed on the shaft of an engine. A slot is made through this shaft, and a board of the same section slides in the slot. The drum is placed in a cylindrical box, at a tangent to the cylinder, and rests upon the lower part of it. The steam is introduced through a pipe into the space between a face of the palette and the line of contact of the palette and drum with the concave surface of the enclosing cylinder, and gives a direct and continuous motion to the axle.

The machine is used to pump water, and to force water "for "the supply of the machine, and for a condenser, and to propel "vessels without screw or paddle."

[Printed, 10*d*. Drawing. *See* Patent Journal, vol. 3, p. 123.]

A.D. 1847, January 21.—N° 11,539.

ONION, THOMAS.—"Improvements in rotatory engines."

A "rotatory engine" is shewn in the drawings, which it is stated may, amongst other uses, be employed for "marine pur-"poses." "Metallic packing rings" are firmly inserted in circular gooves "upon helical springs in the side of the cylinder," to make "the circular aperture of the engine" perfectly steam tight. An "eccentric groove" is shewn, in which the "truck axles of the piston" travel, of such a shape "that the piston may be drawn up and pass over the "divisional abutment." The inventor expressly does not claim the invention of the whole engine, but merely the parts above referred to.

[Printed, 1*s*. 2*d*. Drawings. *See* Patent Journal, vol. 3, p. 210.]

A.D. 1847, February 8.—N° 11,570.

GEARY, STEPHEN.—"Improvements in obtaining and applying "motive power."

This invention is principally intended to be used in locomotives, but a modification of it may be used for the propulsion of vessels. A framework is mounted upon wheels which run on an endless circular rail, so that it revolves about an axis. These wheels as they move pass over the ends of piston rods and depress them, so as to compress air in cylinders below the rail. From the cylinders the air passes to a reservoir, whence it may be taken to be employed in the same way as steam. Motion is given to the apparatus, by means of gearing worked by manual labour. If the weight of the frame and wheels is insufficient, they may be forced down on the piston rods by means of a worm and worm wheel.

[Printed, 1*s*. 10*d*. Drawings. *See* Patent Journal, vol. 3, p. 291.]

A.D. 1847, April 8.—N° 11,652.

NAPIER, DAVID.—"Improvements in steam engines and steam "*vessels*."

A "flexible connection" is applied between the cylinder cover and the stuffing box, so that the piston rod may "assume varied "angles with the piston."

The stuffing box "is made to slide on the cover of the cylinder." There are several slides, each moving on the one below, between the stuffing box and the cylinder. The stuffing box may be surrounded "with a chamber of lubricating matter."

In engines with two rods to one piston, the pistons are connected to bars, and these bars to the crank by a forked connecting rod. By these means the shaft may be brought near the cylinder.

A condenser is fitted so that its lower part is exposed to the water at the bottom of a steam vessel. The tubes are all separable, and may be stopped by plugs.

A separate engine is used to pump the water through the condensing chambers.

[Printed, 1*s*. Drawings. *See* Repertory of Arts, vol. 10 (*enlarged series*), p. 326; Patent Journal, vol. 3, p. 498.]

A.D. 1847, May 4.—Nº 11,687.

STOW, GARDNER.—"Improvements in the construction of "steam vessels, and in apparatus for propelling ships and other "vessels."

[No Specification enrolled.]

A.D. 1848, January 4.—Nº 12,010. (* *)

HUMPHRYS, EDWARD.—This invention relates to the arrangement and disposition of the parts of direct-acting steam engines adapted to drive a screw propeller, and to the valves of air and other pumps.

A pair of horizontal engines is described; the cylinders are placed in a parallel position across the vessel on a suitable foundation, and the cross heads of the piston rods are supported in horizontal guides; instead of a crank shaft, the connecting rods are coupled to crank pins respectively fixed at a suitable distance from the axes of the spur driving wheels, projecting from their outer sides; these wheels are fixed, one at each end of a short driving shaft disposed at right angles to and between the lines of motion of the piston rods, so that the connecting rods clear the ends of the shaft. The propeller shaft, level with the surface of the foundation plate, lies beneath the piston rods at right angles thereto, and carries two toothed pinions which respectively gear into the two spur wheels; the relative sizes of the wheels and pinions determine the speed of the propeller shaft which (according to the drawing) appears to revolve twice to each revolution of the spur wheels. The air pumps are intermediately placed and worked by excentrics on the driving shaft.

Thin plates of spring steel or other metal are used for covering the apertures in the valves. These plates are held by a couple of screws at one end, and yield when pressed against the fluid, instantly closing upon the aperture without noise, as soon as the action is reversed.

[Printed, 8*d.* Drawings. *See* London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 411; Mechanics' Magazine, vol. 49, p. 36; Artizan, vol. 6, p. 226, and vol. 10, p. 21; Patent Journal, vol. 5, p. 176; Engineers' and Architects' Journal, vol. 11, p. 247.]

A.D. 1848, June 8.—N° 12,181.

DARLU, Alexander Paul Marie.—" Improvements in " obtaining motive power."

The description in the specification is very obscure, and it appears to be badly translated from a French original. The inventor proposes to drive vessels by compressed air expelled through pipes below the "floating part of the vessel." The apparatus is not clearly explained, but it seems that it resembles that used by the inventor for pumping water. In this two cylinders are connected by pipes, one is immersed in the water and the other has a vacuum produced in it by steam. Water is thus drawn into the immersed cylinder, and by some means not explained thence into a pipe, which leads it to the height required. How the air is compressed by this apparatus, or in what way it is to be applied to marine propulsion, is not definitely stated.

[Printed, 1*s.* Drawings. *See* Mechanics' Magazine, vol. 49, p. 597; Practical Mechanics' Journal, vol. 1, p. 280.]

A.D. 1848, September 15.—N° 12,269.

SAGER, William.—" Improved means and apparatus for " effecting the transit or conveyance of goods, passengers, and " correspondence by land or water, and for other such purposes; " part or parts of which means and apparatus constitute a new " and improved method of generating steam, which improvement " is applicable to other purposes to which steam is generally " applied as a motive power."

In the steam generator several rows of fire-bars are arranged one above the other, with pipes of various shapes between them. Within these pipes are smaller pipes, pierced throughout with holes through which water may be injected on the inner surface of the larger pipes, to be converted into steam.

For propelling boats on canals rods are worked by the engines, either directly or by means of excentrics, which rest against the bed of the canal and so propel the boat. The rods may be pointed, or may have a toothed roller at their ends to roll forward while the rod is being dragged on, but remain fixed, while the rod is pushed against the bottom.

[Printed, 3*s.* 2*d.* Drawings. *See* Mechanics' Magazine, vol. 50, p. 261; Artizan, vol. 7, p. 207; Patent Journal, vol. 6, p. 234.]

A.D. 1848, October 12.—N° 12,285.

WRIGHT, John.—"Improvements in generating steam and "evaporating fluids."

The invention "relates to the construction and application of "tubes, and a particular kind of cellular vessel charged with "water or certain other fluids, whereby heat may be transmitted "from a fire or furnace to the interior of steam boilers" or other vessels. Water or other liquid is confined in an endless tube, part of which tube is within the furnace, and part within the boiler. Instead of constructing such tubes separately, the patentee makes a "cellular vessel" consisting of a series of parallel tubes. These "cellular vessels" are immersed in the boiler, and being connected with tubes lying in the furnace, transmit heat to the water in the boiler. Various methods of construction and varieties of shape for these vessels are described. In marine boilers there are several sets of these vessels, each set having a corresponding set in the furnace or flue. There may also be a set above the level of the water in the boiler, against which the water from the supply pipe can be directed. The vessels may be charged with oils, coal tar, or any fluid that does not boil at a low temperature, or with "such a mercurial amalgam as does not solidify at the "ordinary atmospheric temperature."

[Printed, 1*s.* 2*d.* Drawings. *See* London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 328; Mechanics' Magazine, vol. 50, p. 356; Practical Mechanics' Journal, vol. 2, p. 214; Artizan, vol. 7, p. 231; Patent Journal, vol. 7, p. 11.]

A.D. 1849, October 12.—N° 12,810.

BONELL, CORNELIUS.—" Improvements in rotatory engines to " be worked by steam or other means, and also in the con" struction of carriages, vessels, or other vehicles to be worked " or propelled by the said improvements in rotatory engines or " other motive power, and for the machinery to be connected " therewith."

One cylinder works excentrically within another, resting on its circumference at its lowest part. Two plungers connected by a rod traverse the two cylinders so that the plungers rest upon the internal periphery of the larger cylinder. Steam is admitted at the bottom, and drives round the plungers and smaller cylinder.

To propel vessels a warp is led between two wheels, one of which is actuated by the engine. The warp is held tight by springs acting on the wheels.

[Printed, 8*d*. Drawing. *See* Mechanics' Magazine, vol. 52, p. 316; Patent Journal, vol. 9, p. 20.]

A.D. 1850, July 3.—N° 13,160.

PIM, WAKEFIELD.—" Improvements in the construction of the boilers and funnels of steam engines."

The tubes from the furnace are made to pass twice through the boiler, being led from the back of the boiler to the front, whence they return to the chimney. They are therefore arranged in two tiers, with a water-space between. By this means " a double " circulation " is given to the flame and heated gases arising from the furnace.

[Printed, 10*d*. Drawing. *See* London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 179; Mechanics' Magazine, vol. 54, p. 38; Engineers' and Architects' Journal, vol. 14, p. 64; Practical Mechanics' Journal, vol. 3, p. 230; Artizan, vol. 9, pp. 30 and 68; Patent Journal, vol. 10, p. 165.]

A.D. 1850, August 22.—N° 13,235.

NEWTON, WILLIAM EDWARD. — (*A communication.*)—" Im" provements in the construction of ships or vessels, and in steam " boilers or generators."

The first part of this invention refers to the construction of vessels to be driven by stern propellers, but there is no improvement in the propeller. Principally it consists in " making the

" line of the keel inclined to the line of the bilge, and of gradually " greater depth at the stern."

"The second part of the invention consists in arranging the " direct flues in one cylinder, and the return flues in another " cylinder, the two being placed side by side or one on top of " the other, the two cylinders being made to communicate with " each other for the free passage of water; the shells or castings " of the two cylinders being also so connected and bound together " that each cylinder shall be exposed to no more pressure than " would be due to a boiler of the capacity of only one of the " cylinders."

[Printed, 10*d*. Drawing. *See* London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 276; Mechanics' Magazine, vol. 54, p. 196; Patent Journal, vol. 10, p. 280; Engineers' and Architects' Journal, vol. 14, p. 153.]

A.D. 1850, September 5.—Nº 13,241.

LILLIE, Sir John Scott.—" Improvements in the application " of motive power."

Vessels are propelled "by means of currents of air or other " elastic fluids acting on the water through inverted troughs" fixed to the vessel below the water line. "These currents are to " be introduced into such channels by means of a vertical shaft" having branches to each channel. The channels run from stem to stern, and by means of a valve the current may be directed either ahead or astern. The currents are to be produced by any suitable means.

Secondly, paddle wheels are suspended " at or near the stem," so that the currents may strike against them. Or the currents may be driven against the floats of paddle wheels by means of tubes or cylinders " without the intervention " of the troughs.

[Printed, 4*d*. No Drawings. *See* Mechanics' Magazine, vol. 54, p. 198; Engineers' and Architects' Journal, vol. 14, p. 166; Patent Journal, vol. 10, p. 270.]

A.D. 1850, October 24.—Nº 13,297. (* *)

YORK, John Oliver.—" Generating steam in locomotive, " marine, and other boilers."

The invention refers to a method of using gas for heating marine and other boilers.

The boiler is cylindrical, with a circular fire-box at one end for burning the coke. "Throttlers," vessels having an egg shape, and filled with water, are placed within the cylindrical flue leading from the fire-hearth and serve as bridges, resisting the draft. The gas is carried underneath the whole length of the boiler. A wrought-iron casing is fixed outside the gas pipe, in which holes are drilled at certain distances to admit air; from this flue a casing rises on each side into a chimney, and where the flues meet a reservoir of water is placed, which is partially heated before entering the boiler. For locomotive or marine purposes, the gas must be compressed into vessels and be carried by the tender. In iron ships an iron tube of two or more feet in diameter may be made to form the keel of the vessel, carrying a great quantity of gas without taking up the best space in the ship, besides increasing enormously the strength of the ship.

Another furnace described may either be used with gas or coke, or both. It forms a horizontal cylinder enclosing all the heating surfaces. From the surface at one end a number of small tubes are carried into the smoke box, heating the water they run through; other flues running parallel are arranged for the passage and combustion of the gas. "The pressure and supply " should be regulated by the gasometer and cocks."

[Printed, 10*d*. Drawing. *See* Mechanics' Magazine, vol. 54, p. 359; Patent Journal, vol. 11. p. 51.]

A.D. 1851, March 11.—N° 13,552.

GALLOWAY, William, and GALLOWAY, John.—"Im- " provements in steam engines and boilers."

The invention relates, firstly, to "the employment of various " arrangements of water tubes in boilers." The fire flue runs through the boiler, and across it are fitted a number of water tubes. These tubes are "conical or larger in diameter at one " end than at the other, the larger end being sufficiently large to " admit of the passage of the smaller end and its flange." They are placed alternately so as to break up the flame as much as possible.

Various shapes of boilers are shown in the drawings, one " particularly adapted for a marine boiler." In it the furnace is surrounded by water, and the flue is similar to the one described above. Another for the same purpose has fire flues instead of water tubes.

Secondly, fire-flues are constructed "of a triangular shape, " stayed internally."

Thirdly, dampers are fitted under the back set of fire-bars in each of a pair of furnaces. “By throwing coal alternately on “ each of the two fires, and regulating the ingress of air by the “ dampers,” “ the whole or the greater part of the smoke may be “ consumed.”

Fourthly, sediment is collected in an “external sediment collector” “furnished with an agitator and a blow-off cock.”

Fifthly, various improvements are described in the valves of “ steam engines, most of them referring to “vandyking” the edges of the valves for the gradual admission of steam.

There are in all eighteen claims, none of which have special reference to marine engines.

[Printed, 2s. 8d. Drawings. *See* Mechanics' Magazine, vol. 55, p. 239; Patent Journal, vol. 11, p. 287; Artizan, vol. 8, p. 100; vol. 9, p. 268; vol. 10, p. 217.]

A.D. 1851, ... —N° 13,552.*

GALLOWAY, WILLIAM, and GALLOWAY, JOHN.

By Disclaimer filed April 9, 1859, the patentees disclaimed certain parts of their invention, Patent No. 13,552, A.D. 1851, and left only the following parts, which they still claimed:—

“Firstly, the constructing boilers with flues or chambers con- “ taining conical water tubes with flanges at their ends, and of “ such form that the flange of the lower end may pass through “ the hole which receives the upper end of the tube.”

“Secondly, the constructing boilers with flues or chambers “ containing conical water tubes, with flanges at their ends, so “ placed that the one flange is within and the other without the “ flue or chamber.”

“Thirdly, the constructing the slide valves with a ‘vandyked’ “ edge.”

“Fourthly, the constructing the slide valves” “and the faces “ whereon they work, with two or more passages for the escape “ of the waste steam.”

Fifthly, combining the last two constructions together.

[Printed, 6d. No Drawings.]

A.D. 1851, July 31.—N° 13,706. (* *)

WHITELAW, JAMES.—Arrangement of parts and combinations of engines for actuating screw propellers, or mechanism requiring great rapidity of motion.

The engines are fitted with cranks of a length more than equal to one-half of the stroke of the piston, which enable it to be driven at a greater speed than ordinary engines with a similar length of crank, or to work at a great speed by means of a short stroke piston actuating a long crank.

Side lever engines are used in which the centre of the piston rod, the connecting main centre, and the connecting rod centre are not in one plane or level, in order to economize space. This combines the advantages of long and short stroke engines in one.

Several sections of screw steamers on the improved arrangement are described; also a pair of vertical cylinder engines; and a horizontal cylinder engine, having an equally divided beam; also engines with beams working between each other; and others for actuating screw propellers direct by a long crank and short stroke.

Curved or bent side levers are used. The fulcrum rod connection is placed between the fulcrum of the beam and the connecting rod centre. A method of obtaining greater lengths of connecting rod by lowering the beam is shewn. Duplex or jointed connection rods are employed to produce the effect of inflexible rods of similar length.

In Woolf's double cylinder or expansion engine, a cylinder is placed on each side of the main working centre of the beam, or two short stroked cylinders, one above the other, to economize space.

To obtain uniformity of effect, the inertia of the moving parts is made to equalize the varying pressure of the steam. Also weights are added to the moving parts to produce this action. The external steam pressure on the backs of the slide valves is balanced by fluid pressure from beneath.

A method of "regulating the rate of an engine by the addition "of a secondary action to the ordinary governing apparatus" is shewn.

Flexible rings or annular discs are used for buckets or lifting valves.

[Printed, 1*s*. 2*d*. Drawings. *See* Mechanics' Magazine, vol. 56, pp. 135 and 181; Practical Mechanics' Journal, vol. 4, p. 277; also vol. 5, p. 73.]

A.D. 1851, September 11.—N° 13,744. (* *)

MAIN, DAVID.—Duplex compensating engine. Moveable furnace bars.

The engine is "composed of a pair of engines so combined "that every single stroke of each piston produces, with the help "a like single stroke of its companion pistons, two revolutions "of a working shaft; and any strain which either might exert on "the crank is so counteracted and neutralized, that the dead "weight of the moving parts is all that the shaft bearings have "to sustain."

The slide valves are worked by an "equilateral motion," by which the weight of the valves is just overbalanced by the weight of the excentric rods; and every strain throughout the engine is so counterbalanced that the two engines work in perfect unison, and the entire weight of the machinery may be thrown low in the vessels, and in ships of war may be wholly under the water line.

A modification is shewn in which two cranks only are placed at right angles on the driving shaft, and the duplex motion given out by rods and levers. In another modification two shafts are used for two screw propellers, one under each quarter of the ship. An improved method of fitting the shafts is shewn where two screw propellers are placed one under each quarter of the ship. The shafts are contained in strong iron trunks worked into the framework of the ship, and connected by diagonal bracing.

The air and other auxiliary pumps are worked at one half the velocity of the engine by means of rollers running on the peripheries of a wheel formed as a geometrical helix or volute, and the helices of the two pumps are adjusted, so that as one pump finishes its stroke the other is commencing its stroke.

A furnace with revolving grate bars is described. On the side of each grate bar a projection is formed which fits into a corresponding recess in the adjoining bar, so that any number of bars can be interlocked, and form an endless chain. A second improvement regulates the feed of fuel, which is partially choked before its admission into the furnace; it falls from a hopper with a hinged flap upon a dead plate at the mouth of the furnace. The entire apparatus may be lifted up when the fire is to be drawn or clinker removed.

[Printed, 2*s*. 8*d*. Drawings. *See* Mechanics' Magazine, vol. 56, pp. 238, 241, 261, 281, and 441.]

A.D. 1851, December 8.—N° 13,843.

HARRISON, JOSEPH.—"Improvements in steam engines and "boilers."

In the Specification are described improvements in marine, locomotive, and stationary boilers.

In the marine boiler the fire-box is carried forward into the interior of the boiler, to which it conforms in shape. It is surrounded by a water space. "The open space in the fire-box "above the fire is filled at certain intervals with horizontal "tubes" "leading from the water space immediately over the "fire-doors to the extreme end of the part of the fire-box extending into the boiler." These tubes contain water. The products of combustion, after passing amongst these tubes, enter a series of smaller tubes which lead into the smoke chamber. The heating surface in the smoke chamber may be used either for heating water in connection with the boiler, or for surcharging steam. Thence the heated gases pass along another series of tubes, which lead through the first-mentioned set. "In place of the ordinary "screw stay for connecting the exterior to the interior parts of "the furnace or fire-box," a stay is made of a wrought iron or other metal tube in the shape of the ordinary "hat" used for increasing the heating surface, the end of which passes through the inner and the outer sheets of the fire-box, and is screwed tight by a bolt on the outside. On the water side free circulation is made into the tube by holes. By the stay being thus made removeable, the boiler is more easily cleaned.

[Printed, 6*s.* 4*d.* Drawings. *See* Mechanics' Magazine, vol. 56, p. 498; Engineers' and Architects' Journal, vol. 15, p. 237.]

A.D. 1852, January 31.—N° 13,942.

COWPER, Charles.—(*A communication.*)—"Improvements in "multiplying motion, applicable to steam engines, saw mills, "and other machinery."

The improvement consists in multiplying motion by levers attached to the piston of a steam engine in such a manner that each stroke of the piston produces "two, four, eight, or more "strokes." The piston rod carries a cross head and two side rods which are jointed to levers. These levers are again jointed to connecting rods attached to a second pair of levers on a fixed shaft. The piston in one movement raises this second pair of levers and lets it fall, thus producing a double motion of the shaft. On this shaft is another lever which transmits motion to another shaft, and this drives the screw propeller.

By a similar arrangement of levers an oscillating engine may be adapted so that the cylinder makes two oscillations for each stroke of the piston.

[Printed, 8*d*. Drawing.]

A.D. 1852, August 12.—N° 14,259.

ADAMSON, DANIEL, and COOPER, LEONARD.—" Improve-
" ments in the construction of steam engines and steam boilers ;
" also in the method of using and rarefying steam, part of
" which improvements are applicable to marine, locomotive, and
" other boilers, and marine architecture in general, as well as in
" cisterns, tanks, and articles of a like nature."

In the improved boiler the products of combustion pass horizontally along the flues through the boiler, and then downwards through a series of tubes to the chimney.

To connect plates of metal, flanges are turned up at right angles and rivetted.

The traverse of the expansion valve is regulated by the governor so that the admission of steam is regulated by the load of the engine. In air pumps for condensing engines the valve in the piston is dispensed with, and the delivery valve placed at the bottom of the pump.

Steam is superheated in a chamber filled with holes, which is placed within the boiler.

[Printed, 1*s*. Drawings. *See* Mechanics' Magazine, vol. 58, p. 175.]

A.D. 1852, November 23.—N° 832. (* *)

BEALE, JOHN.—" An improved arrangement of steam engine,
" and an improved packing to be used therein."

To produce a more compact and economic engine the inventor recesses the piston so as to allow the depression of that part of the cylinder cover which carries the packing, and fits the piston with a hollow rod or central tube, in which the connecting rod works. He also uses guides to take the lateral thrusts off the piston, and makes recesses in it to allow free steam-way into the tubular chamber.

For packing two or more flat rings of a metallic alloy, are used, provided with numerous openings or slots cut nearly through them, which commence at the interior and exterior circumference alternately to give them elasticity. The packing is kept in its place by the flange bolted to the cylinder cover.

The patentee states that the chief object of his invention is to produce a compact, efficient, and economic engine more especially applicable for steam ships and boats.

[Printed, 6*d*. Drawing.]

A.D. 1852, December 2.—N° 934. (* *)

WHYTEHEAD, William Keld.—"Improvements in steam "engines and steam boilers."

Three cylinders, pistons, and connecting rods are combined to drive a screw propeller without the intervention of toothed wheels. The form of the engines admits of their being placed in the after part of the ship, and the propeller shaft low down in it The centre lines are placed at an angle of 60° with each other, so that when the piston of one is at the end of its stroke, the pistons in the other two cylinders have made one-third and two-thirds of their stroke, thus obtaining greater regularity of motion than by two engines. To distribute the strain on the piston rod each piston has two piston rods, a cross head, and guides. The force of the steam is transmitted from the cross heads to a single crank pin, and from the relative position of the cylinders one eccentric works three valves.

The boiler is cylindrical and placed horizontally, and encloses two cylindrical flues that extend the whole length of the boiler, and contain the fire-chamber and a number of small water and also fire tubes, through which the flame and hot gases flow in their way into the chimney. The water is admitted at the lower end of the generator, and the steam escapes at its opposite upper end into the steam space in the boiler.

[Printed, 8*d*. Drawings.]

A.D. 1853, March 5.—N° 556.

WEATHERDON, Baldwin Fulford, and DEALTRY, Charles.—"Improvements in the construction of certain floating "vessels, and in the mode of propelling them."

Vessels are constructed "with a series of wheels, or buoyant "drums or cylinders, firmly keyed upon their respective shafts, "and supported by strong framework to each side of the vessel," "and so arranged and constructed as to buoy up and support "the hull entirely out of the water with the exception of a deep "narrow keel, to which will be attached the rudder."

To sink the vessel "water ballast" may be pumped in. The drums are built in compartments, to avoid danger from leakage. "An internal pressure" "equal to seven pounds upon the square "inch," is kept up on the interior of each wheel, to expel any water which may leak in. The drums are worked by engines.

In screw steamers a larger keel is used, so that "increased "radius may be given to the screw blades." The stern post is shaped so that the boss "may be less subject" "to the water "striking against it; and anti-friction rollers are substituted "for the ordinary bearing blocks of screw shafting."

[Printed, 1*s*. Drawings.]

A.D. 1853, March 18.—N° 667. (* *)

JOHNSON, JOHN HENRY.—(*A communication.*)—"Improvements in steam engines."

The inventor diminishes the constant jarring and undue straining of the crank shaft, engine framing, and vessel hull by arranging the cranks on the main shaft diametrically opposite to each other. Whatever be the weight or speed of the cranks the reaction will be entirely neutralized, as at the same instant that one piston approaches the top of one cylinder, the other piston approaches the bottom of the second cylinder, and an equilibrium of pressure is exerted and maintained against the main bearings of the shaft throughout its entire revolution. Four cylinders are shown in the drawing, the cranks of one pair placed at right angles with those of the other pair, but they may be arranged so as to form a certain angle more or less obtuse, instead of a right angle.

[Printed, 8*d*. Drawing.]

A.D. 1853, July 19.—N° 1711.

BRIMS, DONALD.—"An improved safety apparatus for the protection and preservation of life on water."

A cylindrical boat is described, roofed over, and intended to hold the crew always under cover. It is propelled by oars, which are pivoted by universal joints to the gunwale. When not in use the oars are turned up and lashed together along the gunwale. Paddles with two folding leaves are also used. Their handles are curved so that the blade acts vertically in the water. They are moved straight backwards and forwards, and collapse for the return stroke. The boat may also be propelled by a screw set in the dead wood in the stern, and worked by manual power.

[Printed, 1*s*. Drawings.]

A.D. 1853, November 16.—Nº 2660. (* *)

BRISTOW, James, and ATTWOOD, Henry.—The construction of marine boilers, is improved by bringing the adjacent fire-places into communication with each other for the purpose of turning the smoke which is generated in one fire-place after each successive supply of coals, on to the bright fire in the adjoining fire-place, and thereby "effecting the consumption of "the smoke." The connection of the adjacent fire-places is formed by lateral flues of plate iron passed through the intervening water spaces near the fire doors, forming a communication open at all times between the fire-places. The damper in each fire-place is set at or near the part where the several flues diverge.

[Printed, 6*d*. Drawing.]

A.D. 1854, February 13.—Nº 349. (* *)

MACNAB, William.—(*Provisional protection only.*)—"Improvements in steam engines."

These improvements apply to the trunk engines used for marine purposes. A single front trunk is used for the connecting rod to work through. The piston has no central passage, and the connecting rod joint is on the side next the crank shaft. A solid piston rod works through an outside stuffing box, and "answers "as a guide as well as a means of oiling," by having a small hole bored through its centre from the outer end; this hole has diverging branches passing to the working surfaces of the connecting rod joint through the body of the piston, so that the oil poured in from the upper end of the piston may flow freely through; or the solid rod may be made tubular with a solid neck at its connection with the piston.

The cylinders of the engines are arranged with their axes in parallel vertical lines, standing fore and aft with the connecting rods, working downwards to the cranks. The pin of the connecting rod joint works the air pump, rods from each pin or "joint stud" being passed through the trunk to the plungers.

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 3.—N° 991. (* *)

MAIN, Thomas.—(*Provisional protection only.*)—"Improvements in steam engines."

An arrangement to secure the power of running at a high speed. Two steam cylinders of a double engine, such as would be suitable for actuating a screw propeller, are set about an angle of 45° with the vertical line, with their lower ends towards each other. Each of the two piston rods has a long crosshead, and from its ends rods pass to cranks on the screw shaft, which runs close to the lower ends of the cylinders. The air pumps are inclined in a reverse direction to that of the cylinders; the starboard piston works the port air pump, and the port piston the starboard air pump, or two pistons' rods may be used for one pump. The valves of both cylinders are worked by a single eccentric. The bilge and feed pumps are worked by a crosshead carried by the air pump.

Engines on this model can be placed entirely under the water line.

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 10.—N° 1041.

HOBY, James Ward, and MILNER, John.—"Improvements in steam engines."

The invention relates to that class of steam engines known as "trunk engines," in which the piston rod is replaced by a hollow pipe, within which the connecting rod is jointed and capable of vibrating. To the top of the trunk is attached a crosshead which works the various pumps of the engine. "The connecting rod is jointed to the piston or to the trunk at an intermediate point between the piston and the top of the trunk," so as to diminish the lateral pressure on the piston, and reduce the diameter of the trunk. In place of the crosshead, a short beam may be employed. A trunk or pipe may be attached to the cylinder cover, instead of its being attached to the piston, and in that case the cylinder cover is constructed "with a pipe or cylindrical trunk, as part thereof, or suitably fixed thereto, to serve as a guide for the piston rod." The piston may be concave, and the piston rod packed to work steam-tight within the trunk, or the trunk may be provided with a stuffing-box. The piston rod may be hollow, and the joint of the connecting rod contained within it, as in an ordinary trunk engine.

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in the dead w [illegible] for driving paddle
[Printed, 1s. [illegible] linders for driving

A.D.

BRISTOW, [illegible] (* *
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MACN [illegible]

[illegible] X.—(*A commun ica-*

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The principal object of the invention is to form a pump capable of raising water to a great height. A syphon is employed "com-" bined with a propulsive, centrifugal, or helical spring appa-" ratus, that shall give an impulse to the water contained in the " syphon." Helicoidal cones are preferably employed, moveable and fixed helicals being arranged alternately within the syphon tube. By the fixed helicals the circular direction of the water set in motion by the revolving helicals is changed into a direct motion upwards or forwards.

These improvements "are also applicable to the machinery of " steam boats; for this purpose it is sufficient to surround the " helical of the boat by or with a cylinder fixed on the boat, and " carrying behind the moveable helical a fixed helical of a similar " curviture as herein-before described" (angle of which the sine is ⅐). No further description is given.

[Printed, 8*d*. Drawing.]

A.D. 1854, December 27.—N° 2727.

CARTER, **George**, and SYMONS, **Henry Cyrus**.—"Im-" provements in boilers and furnaces, and in the apparatus for " supplying and regulating the fuel, air, water, and steam."

The invention is intended to increase the "evaporative power " and strength" of steam boilers, to prevent explosion, and insure more perfect combustion of fuel.

"It consists, firstly, in constructing the boiler so as to give " greater strength and more caloric surface by means of plates or " rods passing through the boiler plate, such plate being joined " to other pieces, forming a cross; or the cross may be in a solid " piece, and riveted to others, or intermediately, by curved or " angular pieces.

"Secondly, connecting the internal valves of the feed pump " attached to the boiler to an external rod or lever, whereby in " case of arrangement [*derangement*]" they may be started with facility to continue the constant supply of water.

"Thirdly, to indicate the quantity of water, a tube passes " through a hole or stuffing box, having on one end a steam " whistle and on the other a float, which may move the tube and " allow the steam to escape through an opening therein and in " connection with the steam whistle. When preferred to place " the indicator or water guage outside the boiler, a communication

" is made with a water vessel, to which is attached a beam or " spindle, having an arm thereon to indicate the water level, or " to actuate a slide or cock, which on being opened allows the " steam to escape through a whistle.

"Fourthly, to indicate and regulate the pressure of steam, a " tube sliding through a stuffing box or hole, and having one " end inside and the other outside, made steam-tight, and pressed " by a spring or other instrument, will cause a sliding motion as " the steam pressure varies. By connecting this tube with the " damper, the draught and heat of the furnace is regulated.

"Fifthly, a dangerous steam pressure is prevented by" "passing through the boiler and water a rod which, on being expanded by over-heating, causes the loose end of rod to press a " lever which then opens a safety valve.

"Sixthly, in supplying fuel to the fire by means of fire-bars, " having one edge resting on centre bearings and the other edge " moveable, which on being raised faces [*forces*] the fuel upon " the adjoining bars. By alternately raising and depressing the " bars in succession, the fuel is forced inwards and consumed. " The fire-bars are connected underneath by gearing which may " be worked by manual or machine power.

"Seventhly, in admitting air into any desirable part of a furnace " through a series of metal or fire-ware plates, rings, tubes, or " discs having grooves or channels on their sides for the air to " traverse."

"Eightly, in an improved apparatus for allowing the air to " enter freely for a certain period after fireing, and then to shut " it off gradually. This is effected by means of a valve checked " in its closing by the friction of a spring or other instrument " acting upon a counter-weight; or the valve may be connected " to a lever fixed upon a beam which supports two vessels, the " upper one being filled with matter capable of ascending by its " gravity through an adjustable orifice (sand or fluid may be " advantageously used), and falling gradually turns the beam " and closes the valve; for the next opening of the valve the " same process will be repeated by turning the beam until the " lower or filled vessel reaches the upper side."

Amongst the drawings is one of a marine boiler with the above improvements.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1855, May 29.—N° 1229. (* *)

LEE, Thomas Vincent.—"Improvements in generating steam "in marine and other boilers." A boiler or "generator" of the ordinary construction, having one-tenth the capacity of the "working boiler," generates steam in the usual manner. The steam passes from the generator into an "insulator," the under portion of which is charged with pumice-stone, passing through which the steam is cleared of saline and earthy properties; from the insulator the steam passes into a semicircular coil constructed of copper, cast iron, or fire clay, the pipes being oval or round, and fitted into horizontal pipes and "syphon bends." The pipes are arranged so that each lies over the interspace formed by the two pipes under it. The coil placed across the furnace bars extends to the back of the furnace, and is protected from the direct action of the fire by a lining of fire-tile or iron, and covered in and partially surrounded by water, from which the generator is supplied, thus acting also as a non-conductor. The steam from the generator having passed through the insulator and through the coil, heated to the required temperature, is converted into "hydro-"caloric" or "surcharged steam," and thence transmitted into the "working boiler" by a pipe, having at its end near the bottom of the boiler four apertures for the discharge of the surcharged steam into the body of water in the boiler.

[Printed, 10*d*. Drawing.]

A.D. 1855, October 16.—N° 2308. (* *)

THOMSON, George.—"Improvements in steam engines."

The improvement consists in arranging the valves for cutting off the steam and lessening its expenditure, and rendering direct acting engines uniform in their movements. The whole of the valvular apparatus of a pair of direct acting marine engines may be placed between the two cylinders; the working faces being opposite and parallel, a single steam chest answers for both. The cylinder thoroughfares are of the common three-ported kind; each face has fitted upon it a long working slide valve having a central exhaust cavity on its inner face, and two duplex thoroughfares passing directly through it. Each of these thoroughfares consists of one passage directly through the valve from back to front, with a secondary branch passage opening from the back of the valve, and terminating at its other end in the through passage; each of these duplex thoroughfares has two ports on the back and one on the front face of the valve. The valve is worked in the ordinary manner by an eccentric. The four-ported back of the valve receives three separate valve plates, the central one a plain flat traversing slide disposed on the blank portion of the valve between the ports, worked by a common eccentric so as to govern both the contiguous branch passages of the valve thoroughfares.

The four external ports of the main valve thoroughfares are governed by four adjustable plates, which are stationary during the regular working of the valve, and shifted only when the cut off is to be altered. They are arranged in various ways.

[Printed, 10*d*. Drawing.]

A.D. 1855, November 12.—N° 2539. (* *)

HALL, WILLIAM KEMBLE.—(*A communication.*)—(*Provisional protection only.*)—Marine boiler.

The water spaces, in which the larger portion of the heat is applied, are continued upwards above the level of the water in the boiler, without being exposed to the action of the fire; the water has no tendency to return in them, but flows with the steam formed by its passage over the heated surface, the downward current being supplied by the larger water spaces. The separated currents render the circulation more active and uniform, and prevent the formation of scale.

[Printed, 4*d*. No Drawings.]

A.D. 1855, December 3.—N° 2719. (* *)

ROWAN, WILLIAM.—Improved arrangement of engines.

In this combination which is intended for driving screw propellers, a pair of engines are placed at an angle of 45° or thereabouts, with a vertical line, and are bolted to the upper two faces of a triangular vessel of cast iron, which is formed with the two opposite sides inclined to each other, meeting at top in a right angle. This vessel acts also as a condenser. A valve is introduced in addition to those now in use for the exit of the steam from the cylinders, and an additional or supplementary condenser with which those valves communicate. "In this condenser a "portion of the steam from the cylinder is liquified, but the "quantity of cold water admitted for condensing is no more "than will just condense the steam issuing through the valves, "without producing more than a very partial vacuum," hence is obtained a quantity of water at a nearly boiling temperature for the purpose of feeding the boiler, whereby a better vacuum is obtained in the main condenser.

[Printed, 10*d*. Drawing.]

A.D. 1856, March 19.—N° 652. (* *)

RICHARDSON, THOMAS, and JAFFREYS, GEORGE WILLIAM.—"Improvements in marine steam engines."

"A combination of three direct acting trunk cylinders in the "place of two as heretofore." The cylinders may be placed in any position required, vertically, horizontally, or angularly, and have their piston rods connected to cranks working at equal angles to each other. The air pumps are worked from the trunk of the cylinders, and have the same bed plate.

By this arrangement "a perfectly balanced motion is ensured to "the engine in all its parts without the aid of weights or counter-"poises," and the wear and tear "is reduced at least 50 per "cent." "An increase of the effective power of the engine in "the proportion of from two-thirds to a half is obtained by the "arrangement of three cylinders, two cylinders being constantly "in full working power, whereas, in the case of two cylinders, "one only is working at the points, whilst the centres are being "passed."

[Printed, 6*d*. Drawing.]

A.D. 1856, March 26.—N° 726.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—"Im-"proved apparatus for exploring under water."

A submarine vessel is described. "It is moved by a propeller "turned by persons within, or by a clock spring or electro-"magnetic machine." It may also be towed by a steamer, or dragged by divers. Suspended ballast is provided to enable the boat to rise suddenly.

[Printed, 10*d*. Drawings.]

A.D. 1856, April 1.—N° 786. (* *)

GRAY, JOHN.—"Improvements in steam boilers, furnaces, and fire-bars."

The arrangement of the parts of this boiler is similar to that usually followed in locomotive and marine engines. The heating tubes are placed horizontally, and open at their ends to the front and back smoke boxes; the latter box may connect the three furnaces, or each may have its separate smoke chamber. The horizontal tubes are about six inches in diameter and in two lengths. In the upper surface of each tube is a series of apertures about four inches in diameter, and over and into each aperture is fixed a hollow globe of brass, copper, or iron, which communicates with the interior of the pipe on which it is set, and with the others laterally by short pipes. The products of combustion passing through these tubes, and circulating in the globes, heat the water in the boiler in which they are "enveloped, instead of passing straight through the tubes to the chimney."

A vessel placed in the smoke box heats the water for the fuel.

The upper surface of each fire-bar is a plane intersected by a series of diagonal channels, and this allows a rake being run over them to arrange and clear the fuel.

Furnaces are constructed with moveable cheeks fitted into frames built in the brick work, which may be easily withdrawn and replaced in repairing.

[Printed, 1s. Drawings.]

A.D. 1856, May 23.—N° 1238. (* *)

GALLOWAY, GEORGE BELL.—(*Provisional protection only.*)—"Improvements in the furnaces of marine boilers, and in the construction of steam vessels."

The boiler has an additional fire-place in which it is intended to consume coke; an air channel, which may be placed under the fire-door, has apertures with shut pipes and nozzles communicating with the fire-door frames and fire-bars, which are hollow, and have apertures through which the air escapes in a lateral, and also in a longitudinal direction, by means of apertures through the bridges. "Air being forced into the channel passes into the hollow fire-bars, and out of them into the spaces between the bars;" a grate is fixed below the bars to separate the cinders.

[*Printed, 4d.* No Drawings.]

A.D. 1856, June 13.—N° 1402.

MASON, William.—(*Provisional protection only.*)—“An im-“proved rowlock for boats.”

The “rowlock is formed of metal, and consists of a frame “which embraces the two sides, and covers the top of the gun-“wale of boats, and which carries at top two rests, forming a “crutch for the oar to work in. To secure the rowlock in its “place, mortice holes are made in both sides of the frame and “in the gunwale, through which bolts are passed and secured by “hooks or pins.” It is “advisable to place a plate of metal on “the inside and outside of the gunwale, when of wood, at the “parts where the rowlocks are to be fitted, to obviate any incon-“venience which might arise from the wood swelling.”

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 24.—N° 1488.

NEWTON, Alfred Vincent.—(*Provisional protection only.*)—“An improved construction of life-boat.”

A life-boat consisting of two concentric cylinders is described. “It is fitted at its opposite sides with ducks-foot propellers.” “The outer frame may be turned over on its centres without “affecting the position of the central cylinder. To allow for this “change of position a double set of paddles is provided.”

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 30.—N° 1534.

MORIARTY, Cornelius.—“Improvements in the construction “of tube brushes used in cleaning the tubes of marine, loco-“motive, and all kinds of multitubular boilers.”

The invention “consists of the construction of brushes in such “a manner that the wire, hair, or whalebone constituting the “brushing or scrubbing part of the instrument is placed in a “compact mass in the form of a screw or helix, which has suffi-“cient pitch and space between the thread or threads of the screw “to admit of the brush being screwed in through the ferrule of “the tube.” The soot and dirt also will lodge in the space between the threads. The wire brush may be made the full size of the tube, while in bristle brushes the bristles are not doubled or bent in passing the ferrule. "A further improvement "consists in placing the wire, bristles, or whalebone of the brush "in greater quantity in the middle of the length of the screw," so that the brush is stiffer in the middle. In the process of manufacture the material is cut and then placed "between two, four, "six or other numbers of wires," "at right angles thereto." The wires are then twisted together, so that they hold the bristles, etc. between them. Instead of wire, flat pieces of iron, welded at either end, may be used. A nose piece of iron may be attached at the end of the brush. The brush may be jointed to the handle, or rigidly affixed to it.

[Printed, 8*d*. Drawing.]

A.D. 1856, August 20.—N° 1950. (* *)

MAUDSLAY, Joseph.—Adaptation of an annular cylinder engine to the purposes of screw propulsion.

The invention relates to improvements on No. 8881, A.D. 1841.

The cylinder is placed upright, and directly over the crank shaft, supported on short standards cast on the condenser plate, a firm combination in itself, and not requiring any connection from the vessel to steady it. The piston rod, glands, and cross-head guides are placed on the top of the cylinder cover, where they are easily attended to, and all the joints and moving parts are arranged to be easily got at for oiling.

In this arrangement a much longer connection rod is obtained, and this diminishes the side thrust on the cross head guides.

[Printed 10*d*. Drawing.]

INDEX OF SUBJECT MATTER.

The numbers refer to the pages in which the Abridgments commence. The names printed in *Italic* are those of the persons by whom the inventions have been communicated to the Applicants for Letters Patent.]

Aerostat to tow boats:
- Alborough, 8.

Aile nageoire:
- Balboni, 29.

Air, expelled to propel vessel. *See also* Hydropropulsion:
- Lillie (*Supplement*), 421.
- Bourne, 8.
- Newton, 17.
- Bylandt, 28.
- Kopisch, 30.
- Carter, 40.
- Smith, 96.
- Drewe, 157.
- Spink, 232.
- Kopisch, 234.
- Pheloux and Paumier, 236.
- Holderness, 272.
- Cochrane, 274.
- Lockwood and Weatherill, 285.
- Andreux and Coulon, 304.
- Jones, 311.
- Carter, 381.

Air-pump of steam engine:
- Craddock, 414 (*Supplement*).
- Main, 424 (*Supplement*).
- Limbert, 4.
- Johnson, 22.
- Limbert, 23.
- Fontainemoreau, 3.
- Spencer, 33.
- Carter, 40.
- Spencer, 41.
- Gâche, 42.
- Newton, 47.
- Bousfield (*Barnum*), 119.
- Newcomb and Lovell, 82.
- Munts and King, 135.
- Fletcher, 136.
- Macnab, 142.
- Spencer, 163.
- Davison and Paterson, 170.
- McNaught, 184.
- Rippingille, 189.
- Furlonge, 196.

Air-pump, &c.—*cont.*
- Macnab, 209.
- Knowelden, 217.
- Day, Lamb, and Summers, 252.
- Elder, 275.
- Howden, 278.

Axles. *See* Shaft.

Balloon, floating, to tow vessels.
- James, 166.

Bars, fire, for engine:
- Haycraft, 413 (*Supplement*).
- Sager, 418 (*Supplement*).
- Main, 424 (*Supplement*).
- Carter and Symons, 433 (*Supplement*).
- Gray, 438 (*Supplement*).
- Morrison, 3.
- Parker, 23.
- Galloway, 30.
- Johanny, 44.
- Wright, 62.
- Stevens, 88.
- Guffroy, 117.
- Humphrys, 126.
- Sykes, Sykes, and Crosshead, 127.
- Salmon, 140.
- Martin and Purdie, 152.
- Armstrong, 181.
- Brooman (*Friedmann and Erlanger*), 199.
- McConnell, 212.
- Box, 258.
- Wilson, 269.
- Box, 277.

Bearings. *See* Shafts.

Boiler. *See also* Furnace:
- Bishop, 396 (*Supplement*).
- Brunel, 397 (*Supplement*).
- Teissier, 398 (*Supplement*).
- Fraser, 399 (*Supplement*).
- Udny, 399 (*Supplement*).

Boiler—*cont.*
Brunton, 400 (*Supplement*).
Brunton, 401 (*Supplement*).
Linton, 401 (*Supplement*).
Maudslay, 401 (*Supplement*).
Hearn and Davies, 402 (*Supplement*).
Slater, 403 (*Supplement*).
Seaward, 404 (*Supplement*).
Hall, 405 (*Supplement*).
Parsons, 408 (*Supplement*).
Collier, 410 (*Supplement*).
Haycraft, 413 (*Supplement*).
Craddock, 414 (*Supplement*).
Wright, 419 (*Supplement*).
Pim, 420 (*Supplement*).
Newton, 420 (*Supplement*).
York, 421 (*Supplement*).
Galloway and Galloway, 422 (*Supplement*).
Galloway and Galloway, 423 (*Supplement*).
Harrison, 425 (*Supplement*).
Adamson and Cooper, 427 (*Supplement*).
Whytehead, 428 (*Supplement*).
Bristow and Attwood, 430 (*Supplement*).
MacFarlane, 432 (*Supplement*).
Carter and Symons, 433 (*Supplement*).
Lee, 435 (*Supplement*).
Hall, 436 (*Supplement*).
Rowan, 436 (*Supplement*).
Gray, 438 (*Supplement*).
Galloway, 438 (*Supplement*).
Moore, 2.
Morrison, 3.
Patridge, 6.
Muir, 6.
Sheard and Underwood, 13.
Defis, 21.
Johnson, 22.
Parker, 23.
Löbnitz and Henderson, 26.
Hédiard and Levieux, 26.
Joly, 27.
Picot, 27.
Rennie, 28.
Spencer, 33.
Martin and Martin, 34.
Johnson (*Chameroy*), 36.
Elder, 36.
Neville and Dorsett, 38.
Fletcher, 40.
Biddell and Balk, 41.
Spencer, 41.
Foster, 43.
Hopkinson and Dewhurst, 46.
Robson, 47.
Lee, 48.
Crosland, 49.
Gibson, Pollock, and Martin, 50.
Kingsley, 52.
Williams, 55.
Matley, 55.
Ashton, 56.

Boilers—*cont.*
Newton, 63.
Bleakley, 66.
Humphrys, 67.
Beardmore, 71.
Sharp and Elder, 72.
Bateson, 73.
Newton (*Arnier*), 74.
Montgomery, 76.
Hunt, 80.
Galloway, 83.
Bateson, 85.
Newton (*Boileau*), 87.
Randolph and Elder, 89.
Miller, 90.
Smith, 93.
Newton (*Washington*), 95.
Rowan, 95.
Dunn, 97.
Sloman, 98.
Jack, 102.
Potts, 111.
Johnson (*Desbo[illegible]*), 114.
Wain, 121.
Humphrys, 122.
Morrison, 123.
Redfern, 124.
Humphrys, 126.
Horton and Kendrick, 127.
Brotherhood, 127.
Sykes, Sykes, and Crosshea
127.
Bell, 129.
Butlin, 131.
Macnab, 132.
Wright (*Gray*), 133.
Fletcher, 136.
Miller, 137.
Romaine, 138.
Salmon, 140.
Davies (*Gargan & Co.*), 143.
Davidson, 147.
Grimaldi, 147.
Macnab, 151.
Roberts and Symonds, 154.
Howden, 157.
Murrell, 159.
Fitzmaurice, 162.
Spencer, 163.
Wilson, 163.
Weallens, 166.
Hawksley and Wild, 167.
Lamb, 172.
Bury, 173.
Ridley, 173.
O'Hanlon, 180.
Armstrong, 181.
Adams, 184.
Hughes, 185.
O'Hanlon, 187.
Macnab, 195.
Newton (*Stevens*), 196.
Brooman (*Friedmann and E*
langer), 199.
Grimaldi, 202.
Allchin and Allchin, 203.
Howden, 204.

Boiler—cont.
- Clark (*Arnier*), 205.
- Meriton, 207.
- Davison, 212.
- McConnell, 212.
- Knowelden, 217.
- Williams, 228.
- Cowper, 231.
- Napier and Rankine, 235.
- Inglis, 236.
- Smethurst, 249.
- Bousfield (*Dickerson*), 250.
- Heather and Redfern, 253.
- Tone (*Furness*), 258.
- Wilson, 269.
- Jean, 269.
- Box, 277.
- Howden, 278.
- Burrell, 286.
- Morris, 307.
- Newton (*Stimers*), 308.
- Galloway, 313.
- Thomas, 318.
- Brooman (*Samain*), 370.
- Lake, 335.
- Green and Green, 335.
- Brooman (*Belleville*), 352.
- Adamson, 357.
- Woodward and Woodward, 359.
- Trotman, 378.
- Bousfield (*Thierry*), 383.
- Humphrys, 388.
- Storey, 395.

Fixing;
- Burch, 176.
- Silver and Moore, 196.

Deposits in. *See* Incrustation, &c.

Bows and sterns, Propeller forming. See Propeller, various sorts of.

Brushes for cleaning Boiler-tubes, &c.
- Moriarty, 439 (*Supplement*).
- Cowper, 281.
- Moriarty, 356.

Canal navigation :
- Sager, 418 (*Supplement*).
- Brooman (*Jeandeau*), 1.
- Grahame, 13.
- Robertson, 78.
- Robertson, 114.
- Inchley, 121.
- Lillie, 305.
- Tongue (*Salmon*), 316.

Carbonic oxide for fuel, generating :
- Hinde, 238.

Chain working on bottom. See Propeller, various sorts of.

Counter for registering paddle-wheel revolutions :
- Newton (*Allen*), 121.
- Hayes, 247.

Cranks. *See also* Shaft, crank :
- Howard, 4.
- Batchelor, 98.
- Hackworth, 104.
- Clark (*Arnier*), 205.
- Johnson (*Harris*), 281.

Cylinders and pistons of steam engine.
- Brunel, 397 (*Supplement*).
- Teissier, 398 (*Supplement*).
- Udny, 399 (*Supplement*).
- Slater, 403 (*Supplement*).
- Seaward, 404 (*Supplement*).
- Galloway, 406 (*Supplement*).
- Parsons, 408 (*Supplement*).
- McNaught, 413 (*Supplement*).
- Craddock, 414 (*Supplement*).
- Onion, 416 (*Supplement*).
- Napier, 416 (*Supplement*).
- Humphrys, 417 (*Supplement*).
- Cowper, 426 (*Supplement*).
- Beale, 427 (*Supplement*).
- Whytehead, 428 (*Supplement*).
- Macnab, 430 (*Supplement*).
- Main, 431 (*Supplement*).
- Hoby and Milner, 431 (*Supplement*).
- Bellford, 432 (*Supplement*).
- Richardson and Jaffreys, 437 (*Supplement*).
- Maudslay, 440 (*Supplement*).
- Moore, 2.
- Limbert, 4.
- Limbert, 23.
- Rowland, 23.
- Löbnitz and Henderson, 26.
- Rennie, 28.
- Miller, 31.
- Chaufour, 36.
- Elder, 36.
- Fletcher, 40.
- Spencer, 41.
- Gâche, 42.
- Newton, 47.
- Boydell, 47.
- Parsons, 49.
- Crosland, 49.
- Smith (*Gullet*), 60.
- Allen, 67.
- Humphrys, 67.
- Marshall, 69.
- Rowan, 71.
- Newton (*Arnier*), 74.
- Burgh, 74.
- Montgomery, 76.
- Galloway, 83.
- Howden and Morton, 84.
- Todd, 86.
- Newton (*Boileau*), 87.
- Marshall, 88.

Cylinders, &c.—*cont.*
Turner, 90.
James, 94.
Humphrys, 95.
Batchelor, 98.
Stevens, 101.
Jack, 102.
Elder, 102.
Wenham, 109.
Sells, 111.
Brooman (*Labrousse*), 112.
Spencer, 116.
Bevis, 117.
Uren, 119.
Wain, 121.
Morrison, 123.
Bell, 129.
Macnab, 132.
Silver, 135.
Muntz and King, 135.
Fletcher, 136.
Macnab, 142.
Mennons (*Gâche*), 144.
Macnab, 151.
Henderson, 155.
Howden, 157.
Mardell, 159.
Wilson, 163.
Barling, 165.
Weallens, 166.
Humphrys, 170.
Davison and Paterson, 170.
Blake, 171.
Bury, 173.
Miller, 174.
McNaught, 184.
Adams, 184.
Rippingille, 189.
Silver and Moore, 194.
Macnab, 195.
Jobin, 201.
Howden, 204.
Clark (*Arnier*), 205.
Mennons (*Belou*), 207.
Macnab, 209.
Brickhill, 210.
Spencer, 211.
Peters, 211.
Knowelden, 217.
Glanville, 227.
Cowper, 231.
Mace, 242.
Wymer, 243.
Penn, 246.
Smethurst, 249.
Winans and Winans, 261.
Parker, 271.
Elder, 275.
Howden, 278.
Galloway, 310.
Lawrence (*Ewbank*), 319.
Rankin, 323.
Pokutynski and Mycielski, 325.
Cartwright, 331.
Howard (*Jackson*), 341.
Elder, 365.
Elder, 376.

Cleansing condensers, boil
&c. *See also* Brushes:
Davison and Paterson, 170.
Howden, 204.
Cowper, 231.

Condensers of steam engine
Bishop, 396 (*Supplement*).
Brunel, 397 (*Supplement*).
Parsons, 408 (*Supplement*).
Haycraft, 413 (*Supplement*)
Craddock, 414 (*Supplement*)
Napier, 416 (*Supplement*).
Rowan, 436 (*Supplement*).
Hyde, 1.
Limbert, 4.
Limbert, 23.
Löbnitz and Henderson, 26
Spencer, 33.
Spencer, 41.
Gâche, 42.
Pirsson, 43.
Samuel and Nicholson, 70.
Newton (*Arnier*), 74.
Montgomery, 76.
Newcomb and Lovell, 82.
Galloway, 83.
Howden and Morton, 84.
Todd, 86.
Newton (*Boileau*), 87.
Marshall, 88.
Randolph and Elder, 89.
Turner, 90.
Scott, 91.
Gumpel, 100.
Newton (*Mazeline & Co.*),
Sells, 111.
Spencer, 116.
Wain, 121.
Morrison, 123.
Bell, 129.
Macnab, 132.
Fletcher, 136.
Romaine, 138.
Macnab, 142.
Jack, 144.
Roberts and Symonds, 154
Henderson, 155.
Howden, 157.
Mardell, 159.
Spencer, 163.
Davison and Paterson, 170.
Lamb, 172.
Bury, 173.
Miller, 174.
Jones and Jones, 177.
O'Hanlon, 180.
McNaught, 184.
Clark (*Lighthall and Chr*
185.
Rippingille, 189.
Selby, 190.
Newton (*Stevens*), 195.
Furlonge, 198.
Howden, 204.
Macnab, 209.

ndenser—*cont.*
  Knowelden, 217.
  Weallens, 229.
  Cowper, 231.
  Mace, 242.
  Hayes, 247.
  Smethurst, 249.
  Day, Lamb, and Summers, 253.
  Elder, 275.
  Howden, 278.
  Paterson, 279.
  Wright, 286.
  Newton (*Lighthall*), 297.
  Lawrence (*Ewbank*), 319.
  Wood, 324.
  Crichton, 372.
  Humphrys, 388.

posits in boiler. *See* Incrustation.

redger, propellers for:
  Simons and Brown, 319.
  Kirk, 386.

rums, vessels supported upon:
  Weatherdon and Dealtry, 428 (*Supplement*).
  Houston, 3.
  Rodd, 12.
  Brooman (*Salzmann*), 204.
  Brooman (*Salzmann*), 263.
  Bedder, 321.

um for winding up towing able:
  De Mesnil, 355.

ctricity. *See* Motive power.

gines, steam. *See also* Condensers, Cylinders, Pistons, Governors; (for other engines *see* Motive power):
  Brunel, 397 (*Supplement*).
  Teissier, 389 (*Supplement*).
  Udny, 399 (*Supplement*).
  De Rigel, 402 (*Supplement*).
  Slater, 403 (*Spplement*).
  Seaward, 404 (*Supplement*).
  Hall, 405 (*Supplement*).
  Galloway, 406 (*Supplement*).
  Fairbairn, 407 (*Supplement*).
  Jones, 407 (*Supplement*).
  Parsons, 408 (*Supplement*).
  Byrom, 409 (*Supplement*).
  Lucena, 409 *Supplement*).
  Inglis, 410 (*Supplement*).
  McNaught, 413 (*Supplement*).
  Haycraft, 413 (*Supplement*).
  Craddock, 414 (*Supplement*).
  Poole, 415 (*Supplement*).
  Onion, 416 (*Supplement*).
  Napier, 416 (*Supplement*).

Engines, steam—*cont.*
  Humphrys, 417 (*Supplement*).
  Bonell, 420 (*Supplement*).
  Pim, 420 (*Supplement*).
  Galloway and Galloway, 422 (*Supplement*).
  Whitelaw, 423 (*Supplement*).
  Main, 424 (*Supplement*).
  Harrison, 426 (*Supplement*).
  Cowper, 426 (*Supplement*).
  Beale, 427 (*Supplement*).
  Whytehead, 428 (*Supplement*).
  Johnson, 429 (*Supplement*).
  Macnab, 430 (*Supplement*).
  Main, 431 (*Supplement*).
  Hoby and Milner, 431 (*Supplement*).
  Bellford, 432 (*Supplement*).
  Thomson, 435 (*Supplement*).
  Rowan, 436 (*Supplement*).
  Richardson and Jaffreys, 437 (*Supplement*).
  Maudslay, 440 (*Supplement*).
  Moore, 2.
  Taylor, 3.
  Burrows, 3.
  Limbert, 4.
  Haddan, 4.
  De Bergue, 5.
  Trappes, 11.
  Ogle, 12.
  Travis and Casartelli, 12.
  Silver, 12.
  Sheard and Underwood, 13.
  Grahame, 13.
  Burdon, 16.
  Davies, 20.
  Stewart and Hope, 20.
  Maryon, 22.
  Burrows, 23.
  Limbert, 23.
  Rowland, 23.
  Löbnitz and Henderson, 26.
  Rennie, 28.
  Fontainemoreau, 31.
  Miller, 31.
  Pinker, 32.
  Spencer, 33.
  Chaufour, 36.
  Elder, 36.
  Neville and Dorset, 38.
  Griffiths, 38.
  Carter, 40.
  Fletcher, 40.
  Spencer, 41.
  Gâche, 42.
  Pirsson, 43.
  Newton, 47.
  Boydell, 47.
  Parsons, 49.
  Crosland, 49.
  Bousfield (*Barnum*), 49.
  Winans and Winans, 52.
  Nelson, 53.
  Smith (*Gullett*), 60.
  Johnson (*Wood and Rice*), 61.
  Newton, 63.

Engines, steam—*cont.*

- Jensen, 65.
- Allen, 67.
- Humphrys, 67.
- Marshall, 69.
- Bowie, 70.
- Samuel and Nicholson, 70.
- Rowan, 71.
- Vasserot (*Billetet*), 72.
- Newton (*Arnier*), 74.
- Burgh, 75.
- Montgomery, 76.
- Galloway, 83.
- Howden and Morton, 84.
- Newton (*Sergeant*), 85.
- Todd, 86.
- Russell, 86.
- Marshall, 88.
- Randolph and Elder, 89.
- Turner, 90.
- Smith, 93.
- James, 94.
- Humphrys, 95.
- Rowan, 95.
- Boden, 96.
- Batchelor, 98.
- Meriton, 99.
- Stevens, 101.
- Jack, 102.
- Elder, 102.
- Hackworth, 104.
- Wenham, 109.
- Silver, 110.
- Sells, 111.
- Potts, 111.
- Sievier, 112.
- Brooman (*Labrousse*), 112.
- Eunson, 116.
- Spencer, 116.
- Bevis, 117.
- Uren, 119.
- Inchley, 120.
- Wain, 121.
- Morrison, 123.
- Hamilton and Silver, 123.
- Bell, 129.
- Maxwell, 129.
- Macnab, 132.
- Bousfield (*Dickerson*), 133.
- Silver, 134.
- Boyman, 135.
- Doering, 135.
- Muntz and King, 135.
- Fletcher, 136.
- Romaine, 138.
- Johnson (*Duvoir*), 139.
- Macnab, 142.
- Jack, 144.
- Mennons (*Gâche*), 144.
- Morris, 146.
- Davidson, 147.
- Macnab, 151.
- Roberts and Symonds, 154.
- Henderson, 155.
- Harratt, 155.
- Howden, 157.
- Marrell, 159.
- Fuller, Jaques, and Fanshawe, 161.
- Warwick, 162.
- Spencer, 163.
- Wilson, 163.
- Miller, 165.
- Newton (*Porter*), 165.
- Barling, 165.
- Weallens, 166.
- Humphrys, 170.
- Davison and Paterson, 170.
- Blake, 171.
- Miller, 174.
- McNaught, 184.
- Adams, 184.
- Clark (*Lighthall and Chrystie*), 185.
- Rippingille, 189.
- Silver and Moore, 194.
- Macnab, 195.
- Newton (*Stevens*), 195.
- Furlonge, 198.
- Newton (*Lee*), 199.
- Jobin, 201.
- Howden, 204.
- Mennons (*Belou*), 207.
- Macnab, 209.
- Brickhill, 210.
- Spencer, 210.
- Peters, 211.
- Hill, 224.
- Onion, 226.
- Glanville, 227.
- Weallens, 229.
- Cowper, 231.
- Mace, 242.
- Wymer, 243.
- Penn, 246.
- Hayes, 247.
- Stübbe, 248.
- Smethurst, 249.
- Runkel (*Behrens*), 252.
- Winans and Winans, 261.
- Stanley and Stanley, 270.
- Parker, 271.
- Elder, 275.
- Howden, 278.
- Paterson, 279.
- Wright, 286.
- Fuller, 288.
- Miller, 290.
- Parker, 293.
- Bauer, 295.
- Newton (*Lighthall*), 297.
- Runkel, 303.
- Dean, 305.
- Fontainemoreau (*Neamond*), 307.
- Reid, 308.
- Galloway, 310.
- Cunningham, 314.
- Dean, 318.
- Lawrence (*Ewbank*), 319.
- Rankin, 323.
- Pokutynski and Mycielski, 325.
- Robertson, 326.

Engine, steam—*cont.*
Cartwright, 330.
Cole, Swift, and Seares, 332.
Stevenson (*Venzano*), 333.
Spink, 340.
Howard (*Jackson*), 340.
Winter, 354.
Howden, 358.
Abel (*Tranchant*), 360.
Elder, 365.
Elder, 376.
Humphrys, 388.
Simpson, 388.
Makinson, 395.

Fan for furnace :
O'Hanlon, 187.

Feathering paddles :
Brims (*Supplement*), 429.
McGrade, 7.
Lambert-Alexandre and Mallet, 15.
Fontainemoreau, 18.
Reuver, 29.
Reeve, 32.
Reeve, 34.
Barling, 35.
Collingwood and Collingwood, 37.
Johnson (*Hill*), 42.
Newton, 44.
Huygens de Lowendal, 45.
Taylor and Baugh, 61.
Brooman (*Meunier*), 65.
Robb, 66.
Buchanan, 67.
Buchanan, 68.
Morgan, 73.
Galloway, 83.
Parker, 83.
Reynolds, 92.
Penrice, 94.
Chesneau, 95.
Hirsch, 103.
Newton (*Germain*), 104.
Day, 107.
Williamson and Perkins, 189.
Inchley, 120.
Hiron and Fell, 141.
Austin, 144.
Morris, 146.
Vines, 148.
Henderson, 155.
Lewis, 156.
Newton (*Densmore*), 159.
Birkbeck (*Barker*), 167.
Baxter, 169.
Dean, 184.
Harfield, 186.
Fryer, 192.
Parkes (*Vincent and Goupy*), 194.
Brooman (*De la Baume*), 194.
Cooke and Squire, 201.
Padley, 201.
Tipple, 202.

Feathering paddles—*cont.*
Vaile, 219.
Piatti, 220.
Gavillet and Gandon, 221.
Clark (*Chesneau*), 222.
Davis, 224.
Galli, 226.
Johnson (*Harris*), 281.
Bousfield (*Manley*), 282.
Newton (*Merlett*), 288.
Bateman, 292.
Taylor, 296.
Calvert, 298.
Cousins, 302.
Vaile, 308.
Taylor, 312.
Tongue (*Salmon*), 316.
Gollings, 320.
Dart, 322.
Simpson, 330.
Clark (*Raphin*), 333.
Sedley, 336.
Keene, 336.
Rankine, 338.
Fraser, 340.
Rosselet, 345.
Goodier and Kilshaw, 347.
Harrington, 357.
Forster, 363.
MacGeorge and MacGeorge, 367.
Simpson, 368.

Feathering screw propeller. *See* Propeller, screw, feathering.

Filter for boilers :
Haycraft, 413 (*Supplement*).

Fire-bars. *See* Bars, fire.

Floats. *See* Paddle-floats.

Flues. *See* Boilers and Furnaces.

Furnaces. *See also* Boilers and Bars.
Brunel, 397 (*Supplement*).
Teissier, 398 (*Supplement*).
Maudslay, 401 (*Supplement*).
Slater, 403 (*Supplement*).
Hall, 405 (*Supplement*).
Collier, 410 (*Supplement*).
Pim, 420 (*Supplement*).
York, 421 (*Supplement*).
Galloway and Galloway, 422 (*Supplement*).
Galloway and Galloway, 423 (*Supplement*).
Harrison, 425 (*Supplement*).
Whytehead, 428 (*Supplement*).
Bristow and Attwood, 430 (*Supplement*).
Carter and Symons, 433 (*Supplement*).
Gray, 438 (*Supplement*).
Galloway, 438 (*Supplement*).

Furnace—*cont.*
  Moore, 2.
  Morrison, 2.
  Muir, 9.
  Bourne, 8.
  Sheard and Underwood, 13.
  Hédiard and Levieux, 26.
  Galloway, 30.
  Fletcher, 40.
  Foster, 43.
  Johanny, 44.
  Clark, 45.
  Hopkinson and Dewhurst, 46.
  Gibson, Pollack, and Martin, 50.
  Matley, 55.
  Ashton, 56.
  Bleakley, 66.
  Beardmore, 71.
  Sharp and Elder, 72.
  Bateson, 73.
  Newton (*Arnier*), 74.
  Montgomery, 76.
  Alexander, 78.
  Hunt, 80.
  Bateson, 85.
  Newton (*Boileau*), 87.
  Stevens, 88.
  Miller, 90.
  Rowan, 95.
  Hawkins and Hawkins, 110.
  Johnson (*Desboissières*), 114.
  Guffroy, 117.
  Wain, 121.
  Humphrys, 122.
  Redfern, 124.
  Humphrys, 126.
  Horton and Kendrick, 127.
  Sykes, Sykes, and Crosshead, 127.
  Bell, 129.
  Fletcher, 136.
  Miller, 137.
  Romaine, 138.
  Salmon, 140.
  Macnab, 151.
  Martin and Purdie, 152.
  Newton (*Brandt*), 157.
  Howden, 157.
  Fitzmaurice, 162.
  Hawksley and Wild, 167.
  Bury, 173.
  Ridley, 173.
  Armstrong, 181.
  Adams, 184.
  O'Hanlon, 187.
  Brooman (*Friedmann and Erlanger*), 199.
  Grimaldi, 202.
  Clark (*Arnier*), 205.
  Meriton, 207.
  McConnell, 212.
  Spink, 232.
  Sickels, 233.
  Napier and Rankine, 234.
  Inglis, 236.
  Tolhausen, 239.
  Bousfield (*Dickerson*), 250.
  Thierry, 253.

Furnaces—*cont.*
  Heather and Redfern, 253.
  Tone (*Furness*), 258.
  Box, 258.
  Wilson, 269.
  Jean, 269.
  Parker, 271.
  Box, 277.
  Howden, 278.
  Adams, 289.
  Monro, 307.
  Galloway, 313.
  Thomas, 318.
  Lyttle, 329.
  Lake, 336.
  Green and Green, 335.
  Brooman (*Belleville*), 352.
  Adamson, 357.
  Woodward and Woodward, 3
  Elder, 365.
  Bousfield (*Thierry*), 383.
  Humphrys, 388.

Governors for steam engines
  Brunel, 397 (*Supplement*).
  Craddock, 414 (*Supplement*).
  Taylor, 3.
  Silver, 12.
  Davies, 20.
  Pinker, 32.
  Griffiths, 38,
  Johnson (*Wood and Rice*),
  Newton, 63.
  Jensen, 65.
  Bowie, 70.
  Vasserot (*Billotet*), 72.
  Howden and Morton, 84.
  Newton (*Sergeant*), 85.
  Russell, 86.
  Meriton, 99.
  Silver, 110.
  Sievier, 112.
  Hamilton and Silver, 123.
  Silver, 123.
  Doering, 135.
  Johnston (*Duvoir*), 139.
  Howden, 157.
  Warwick, 162.
  Miller, 165.
  Newton (*Porter*), 105.
  Weallens, 166.
  Newton (*Lee*), 199.
  Mennons (*Belou*), 207.
  Hill, 224.
  Stübbe, 148.
  Runkel (*Behrens*), 252.
  Bauer, 294.
  Runkel, 303.
  Dean, 305.
  Dean, 318.
  Abel (*Tranchant*), 360.

Gauges:
  Limbert, 4.
  Montgomery, 76.
  Newton (*Allen*), 120.

uges—*cont.*
- Morrison, 123.
- Pullan and Cresswell, 131.
- Burrell, 286.

ydrometer.
- Picot, 27.

ydro-propulsion. *See also* Air and steam expelled to propel vessel.
- Darlu, 418 (*Supplement*).
- Schwann, 432 (*Supplement*).
- Bourne, 18.
- Murray, 19.
- Mohr, 22.
- Geach, 26.
- Fontainemoreau, 31.
- Scott, 56.
- Pascoe and Thomas, 64.
- Johnson (*Eaton*), 81.
- Newcomb and Lovell, 82.
- Adamson, 86.
- Gumpel, 100.
- Prideaux, 103.
- Barling, 112.
- Maurer, 119.
- Miller, 122.
- Henry (*Coignard*), 134.
- Palmer and Swift, 142.
- Parker, 152.
- Rammell, 155.
- Drewe, 157.
- Symonds, 168.
- Towl, 179.
- Mennons (*Thier*), 191.
- Fell, 192.
- Standfield and Standfield, 202.
- Henry (*Coignard*), 207.
- Griffiths, 217.
- Terry, 228.
- Yenn, 258.
- Myers and Forbes, 262.
- Johnson (*Gardère and Patek*), 265.
- Moody and Moody, 266.
- Stanley and Stanley, 270.
- Cochrane, 274.
- Græme, 275.
- Græme, 281.
- Myers and Gloag, 282.
- Wyld, 283.
- Henry (*Coignard*), 284.
- Yenn, 292.
- Harvey, 293.
- Galloway, 310.
- Watson, 313.
- Brooman (*Samain*), 320.
- Ruthven, 323.
- Jopling, 326.
- Spink, 327.
- Calvert, 328.
- Davies, 334.
- Ferrier, 347.
- Brookes (*Farcot, Farcot, Farcot, Chateau and Farcot*), 350.

Hydro-propulsion—*cont.*
- Howden, 358.
- Spink, 359.
- Swift, 362.
- Phillips, 367.
- Boyman, 372.
- Parker, 376.
- De Rusett and Dale, 379.
- Carter, 381.
- Boulton, 383.
- Forbes, 385.
- Boulton, 388.
- Humphrys, 388.
- Phipps, 390.
- Samuelson, 391.
- Boyman, 391.
- Randolph, 392.
- Harfield, 394.

Incrustation in boilers, means of preventing:
- Teissier, 398 (*Supplement*).
- Brunton, 401 (*Supplement*).
- Defis, 21.
- Martin and Martin, 34.
- Sykes, Sykes and Crosshead, 127.
- Wright (*Gray*), 133.
- Armstrong, 181.
- Davison, 212.
- Jouvin, 221.
- Cowper, 231.
- Adamson, 357.

India-rubber for valves.
- Fuller, Jaques and Fanshawe, 161.

Joints for connecting rods, &c.
- Winter, 354.

Kite, used to tow vessels.
- Cordner, 96.

Land, carriage of boats on.
- Lungley, 43.
- Fuller, 288.

Life-boats, propellers and engines for:
- Beadon, 411 (*Supplement*).
- Orton, 412 (*Supplement*).
- Brims, 429 (*Supplement*).
- Newton, 439 (*Supplement*).
- Newton, 16.
- Davies (*Camp*), 39.
- Galloway, 83.
- Clark (*Scholl*), 177.
- Climie, 306.
- Mols, 348.

Lubricator:
- Hutton, 100.

Manual power. *See* **Motive power.**

Motive power, different means of obtaining :

- Additional, to counterbalance rudder;
  - Sickels, 232.
  - Sickels, 273.
- Atmospheric engine;
  - Geary, 416 (*Supplement*).
  - Smith and Chease, 57.
  - Fell, 192.
  - Miller, 290.
  - Parker, 293.
  - Harvey, 293.
  - Galloway, 310.
  - Gedge (*Cherfils*), 342.
- Compressed air;
  - Jones, 311.
- Condensation of steam;
  - Johnson (*Gardère and Patek*), 265.
- Drum revolved by currents of air;
  - Brazill, 407 (*Supplement*).
- Electricity;
  - Moody and Moody, 266.
  - Galloway, 313.
- Gas discharged on propeller;
  - Budden (*Pilkington*), 150.
- Gas engine.
  - Ador, 404 (*Supplement*).
  - Reynolds, 411 (*Supplement*).
  - Hugon, 248.
  - Clark (*Merlanchon*), 256.
- Heated air;
  - Bourne, 8.
  - Clark, 45.
  - Barton, Shephard, and Evans, 126.
  - Kopisch, 234.
- Heated metal;
  - Johnstone, 384.
- Heat of sun;
  - March, 18.
- Hydraulic engine;
  - Smith and Chease, 242.
- Hydraulic pressure;
  - Murphy, 369.
- Manual power;
  - Brims, 489 (*Supplement*).
  - Newton, 437 (*Supplement*).
  - Quidde and Mayet, 5.
  - Davies (*Camp*), 39.
  - Smith, 64.
  - Oliver, 76.
  - Galloway, 83.
  - Bauer, 125.
  - Clark (*Scholl*), 177.
  - Braxton, 200.
  - Hodson, 264.
  - Merriam, 366.
  - Evelyn, 374.

Motive power—*cont.*

- Manual power and steam combin
  - Harratt, 155.
- Motion of vessel;
  - Galloway, 30.
  - Chadburn and Tristram, 263.
  - Watson (*Smith*), 351.
  - Hamilton, 355.
- Oscillating beam;
  - Cavanna, 9.
- Pendulum;
  - Crispin, 80.
- Rise and fall of waves;
  - Needham, 116.
  - Schiele, 125.
- Shifting weight of cargo;
  - Aldborough, 8.
- Springs;
  - Hamilton, 24.
  - Maberley, 78.
  - Chatterton, 180.
  - Markham (*McIvor*), 316.
  - Gedge (*Chenille*), 393.
- Steam acting against vanes;
  - Parker, 34.
  - Brooman (*Vanossi*), 66.
  - Fraser, 377.
- Steam discharged on propeller;
  - Turner, 187.
  - Budden (*Pilkington*), 236.
- Water from lock turning a wheel;
  - Robertson, 114.
- Weight;
  - James, 94.
- Wind upon sails;
  - Calvert, 29.
  - Sloper, 30.
  - Cave, 39.
  - Brabazon, 61.
  - Maberley, 68.
  - Parker, 83.
  - Johnson (*Le Rouge and De Berly*), 219.
  - Cook and Terrey, 242.
  - Wheatley, 280.
  - Barland and O'Keefe (*Barland*), 283.
  - Barland, 304.

Oars :

- Wilson, 396 (*Supplement*).
- Beadon, 411 (*Supplement*).
- Orton, 412 (*Supplement*).
- Brims, 429 (*Supplement*).
- Pringle, 37.
- Barnes and Loach, 99.
- Clark (*Scholl*), 177.
- Gedge (*Levallois*), 251.
- Macintosh and Thurgar, 311.
- Farcot, 315.
- Bisc, 316.
- Cox, 228.
- Rankine, 338.
- Deane, 353.

Outrigger. *See also.* Oars and Rowlock.
  Green, 242.

Paddle-floats, (Feathering. *See* Feathering paddle):
  Brooman (*Jeandeau*), 1.
  Houston, 3.
  Deane, 9.
  Reed, 10.
  James, 36.
  Pringle, 37.
  Elder, 71.
  Crooker, 86.
  Ranken, 124.
  Watts, 150.
  Gyton, 156.
  Simons, 192.
  Muntz, 213.
  Phillips, 218.
  Leigh, 219.
  Mahon, 230.
  Burchall and Burrows, 236.
  Mahon, 241.
  Ford, 245.
  Appleby, 242.
  Brooman (*Sahler*), 255.
  Page, 256.
  Croft, 261.
  Jolliffe, Jolliffe, Graham, and Taylor, 265.
  Markland, Williams and Sheridan, 282.
  White, 303.
  Baker (*Crooker*), 324.
  McComb (*McComb*), 339.
  Singer, 349.
  Burchall, 353.
  Newton (*Fletcher*), 364.
  Neville and Gorton, 375.

Paddle-shaft. *See* Shaft, paddle.

Paddle-wheel:
  Newton, 409 (*Supplement*).
  Lillie, 421 (*Supplement*).
  Crooker, 7.
  Reed, 10.
  Rodd, 12.
  Fontainemoreau, 18.
  James, 26.
  Collingwood and Collingwood, 37.
  Pringle, 37.
  Johnson (*Hill*), 42.
  Newton, 44.
  Piatti, 55.
  Manning, 70.
  Elder, 71.
  Galloway, 83.
  Crooker, 86.
  Charlton, 105.
  Ranken, 124.
  Hiron and Fell, 141.
  Vines, 148.

Paddle-wheel—*cont.*
  Watts, 150.
  Harratt, 155.
  Gyton, 156.
  Newton (*Densmore*), 156.
  Newton (*Brandt*), 157.
  Simons, 192.
  Cooke and Squire, 201.
  Padley, 201.
  Tipple, 202.
  Muntz, 213.
  Gavillet anp Gandon, 221.
  Clark (*Chesneau*), 222.
  Clark (*Rojare and Rojare*), 225.
  Harris, 228.
  Burchall and Burrows, 236.
  Ford, 245.
  Harris, 251.
  Appleby, 242.
  Brooman (*Sahler*), 255.
  Page, 256.
  Croft, 261.
  Brooman (*Salzmann*), 263.
  Jolliffe, Jolliffe, Graham and Taylor, 265.
  Rigg, 270.
  Markland, Williams and Sheridan, 282.
  Bousfield (*Manby*), 282.
  Newton (*Merlett*), 288.
  Bateman, 292.
  Taylor, 296.
  Calvert, 298.
  White, 303.
  Vine, 306.
  Taylor, 312.
  Tongue (*Salmon*), 317.
  Gollings, 320.
  Dart, 322.
  Baker (*Crooker*), 324.
  Simpson, 330.
  Clark (*Raphin*), 334.
  Sedley, 336.
  Keene, 336.
  McComb (*McComb*), 339.
  Singer, 349.
  Burchall, 353.
  Hirsch, 354.
  Harrington, 657.
  Johnson (*Randall*), 358.
  Russell, 361.
  Forster, 363.
  Newton (*Fletcher*), 364.
  MacGeorge and MacGeorge, 367.
  Neville and Gorton, 375.
  Simpson, 388.
  Makinson, 395.
 Aft of vessel;
  Schön, 145.
  Leigh, 219.
 At end of arm;
  Chaplin, 267.
 Driven by hand;
  Newton, 16.
  Mols, 348.

Paddle-wheel—*cont.*
In centre of vessel;
Winans and Winans, 50.
Winans and Winans, 51.
Winans and Winans, 52.
Greenwood, 53.
Buchanan, 54.
Hamilton, 130.
Singer, 153.
Harfield, 186.
Spencer, 210.
Anderson, 230.
Smethurst, 249.
Brooman (*Sahler*), 255.

Self-acting;
Hamilton, 24.

Submerged;
Brooman (*Jeandeau*), 1.
Brooman, 21.
Prideaux, 103.
Croft, 261.
Caudwell, 321.
Harrington, 357.
Neville and Gorton, 375.

Testing;
Kingsley, 138.

Working on bottom;
Bourne, 1.
Bourne, 18.

Petroleum as fuel:
Tolhausen (*Biddle*), 239.
Adams, 289.

Pistons. *See* Cylinders.

Platform, over which a ship passes:
Osler, 301.

Propeller, auxiliary:
Burch, 176.
Braxton, 200.
Chaplin, 267.

Propeller, screw:
Wingate, 5.
Coward, 7.
James and Grimshaw, 14.
Carleman, 17.
Gaudrion (*Vergne*), 19.
Rennie, 28.
Bylandt, 28.
Gregory and Craymer, 28.
Philp and Philp, 35.
Griffiths, 38.
Browne, 41.
Webster, 48.
Rowan, 54.
Soelman, 60.
Britt, 61.
Beadon, 64.

Propeller, screw—*cont.*
Brooks, 68.
Douglas, 69.
Honeyman, 79.
Soelman, 81.
Galloway, 83.
Middleship, 85.
Prince (*Hirsch*), 92.
Davies (*Jouan*), 94.
Hirsch, 96.
Eastman, 99.
Brooman (*Labrousse*), 112.
Brickhill and Noble, 134.
Hirsch, 144.
Stodart and Benett, 147.
Crispin, 148.
Révy, 148.
Mahon, 153.
Singer, 153.
Roberts and Symonds, 154.
Hart, 154.
Hirsch, 159.
Griffiths, 160.
Moore, 161.
Wilson, 163.
Philp and Philp, 164.
Truss, 169.
Peck, 172.
Burch, 176.
Mahon 191.
Welch, 196.
Philp and Philp, 209.
Owen, 216.
Krupp, 217.
Clarke, 218.
Kennedy, 222.
Griffiths, 223.
Grogan, 235.
Onion, 226.
Carvin, 227.
Carwood, Boaz, and Colwell, 227.
Lowe and Harris, 229.
Mahon, 230.
Grogan, 240.
Mahon, 241.
Watson, 264.
Newton (*Serve*), 268.
Sickels, 273.
Livingtone, 277.
Welch, 281.
Brooman (*Guignes and Chuin*) 294.
Colley, 309.
Hughes (*Dampier*), 317.
Hancock and Hancock, 352.
Young, 361.
Fraser, 377.

Composition for;
Osborne, 366.

Feathering;
Gregory and Craymer, 28.
Grogan, 225.
Grogan, 240.
Livingstone, 277.
Young, 361.

opeller, screw—*cont.*

- reeing from wreck, &c.;
  - Douglas, 57.
  - Douglas, 69.
  - Hudson, 381.
- uard for;
  - Todd, 101.
  - Powell, 106.
  - Cunningham, 206.
  - Hutchinson, 233.
  - Budden (*Pilkington*), 236.
  - Rigg, 270.
  - Clark (*Ganeval*), 382.
- Methods of fitting;
  - Borrie, 412 (*Supplement*).
  - Weatherdon and Dealtry, 428 (*Supplement*).
  - Hyde, 1.
  - Carleman, 17.
  - Penn, 25.
  - Henry, 28.
  - Patridge, 30.
  - Macnab, 32.
  - Wilson, 37.
  - Davies (*Camp*), 39.
  - Langley, 43.
  - Webster, 48.
  - Luis, 52.
  - Gilles, 57.
  - Britt, 61.
  - Normand, 62.
  - Newton (*Huse and Huse*), 69.
  - Delany (*Phillips*), 74.
  - Montgomery, 76.
  - Honeyman, 79.
  - Browne (*Skinner*), 87.
  - Whitehouse, 91.
  - Sampson (*Taggart*), 91.
  - Smith, 93.
  - Smith (*Lacroix*), 108.
  - Brooman (*Labrousse*), 112.
  - Symons, 113.
  - Silver, 134.
  - Revy, 148.
  - Bousfield (*Renwick*), 148.
  - Crichton, 164.
  - Truss, 169.
  - Burch, 176.
  - Jones and Jones, 177.
  - Moore, 183.
  - Silver and Moore, 194.
  - Furlonge, 198.
  - Braxton, 200.
  - Cunningham, 206.
  - Cooke, 213.
  - Moore, 220.
  - Bush, 222.
  - Hay, 223.
  - Curtis, 224.
  - Anderson, 230.
  - Henry (*Le Rouge*), 237.
  - Symonds, 245.
  - Cartwright, 255.
  - Newton (*Harris*), 256.
  - Winans and Winans, 259.
  - Winans and Winans, 260.

Propeller, screw—*cont.*

  - Watson, 264.
  - Tucker, 266.
  - Rigg, 270.
  - Kennedy, 273.
  - Griffiths, 274.
  - Winans and Winans, 276.
  - Rigg, 289.
  - Griffiths, 294.
  - Wimshurst, 294.
  - Shaw, 299.
  - Lees, 300.
  - Thornton, 305.
  - Jackson, 308.
  - Colley, 309.
  - Galloway, 310.
  - Galloway, 313.
  - Hughes (*Dampier*), 317.
  - Griffiths, 322.
  - Atkin, 337.
  - Ferrier, 347.
  - Merriam, 366.
  - Johnson (*Le Rouge*), 370.
  - Griffiths and Rigg, 371.
  - Clark (*Ganeval*), 382.
  - Hughes, 389.
- Self-acting;
  - Hamilton, 24.
- Shaft. *See* Shaft, propeller.
- Testing;
  - Kingsley, 138.
- Unshipping;
  - Borrie, 412 (*Supplement*).
  - Moore, 20.
  - Britt, 61.
  - Montgomery, 76.
  - Eastman, 107.
  - Smith (*Lacroix*), 108.
  - Brooman (*Labrousse*), 112.
  - Burch, 176.
  - Henry (*Le Rouge*), 237.
  - Symonds, 245.
  - Wimshurst, 294.
  - Hall, 309.
  - Atkin, 337.

Propellers, various sorts of:

- Barrels with screw vanes;
  - Clair (*Robatel*), 15.
- Chain along bottom;
  - Lebaudy (*Cail*), 190.
  - Abel (*Cail*), 212.
  - De Mesnil, 355.
- Cylinders or pistons acting directly on the water;
  - Quidde and Mayet, 5.
  - Ogle, 12.
  - Maryón, 22.
  - James, 25.
  - Raymond, 36.
  - Wright, 66.
  - Holmes, 81.
  - Newton (*Phinney*), 85.
  - Griffith, 117.
  - Hulme, 118.

Propellors, &c.—*cont.*
  Simpson, 136.
  Papengouth and Lehmann, 178.
  Chatterton, 190.
  Bush, 222.
  Johnson (*Moulins*), 270.
  Hadfield, 300.
  Clark (*Coumbary*), 344.

Corrugated wheel;
  Coe, 250.
  Vaile, 305.
  Hancock and Hancock, 352.

Disc, rotating;
  Aston, 72.
  Jones and Jones, 177.
  Griffiths, 223.
  Hancock and Hancock, 352.

Duck's foot:
  Newton, 439 (*Supplement*).
  Papengouth and Lehmann, 178.
  Phillips, 197.

Endless chain, carrying floats or buckets;
  Stubbin, 6.
  Catlin, 39.
  Carter, 40.
  Hamilton, 40.
  Newton (*Wolcott*), 83.
  Parker, 83.
  Thomas, 86.
  Dunn, 97.
  Clough, 100.
  Bettles, 118.
  Phillips, 197.
  Vaile, 219.
  Day (*Craig*), 331.

Endless chain working on bottom;
  Robertson, 78.

Flexible tube open to water;
  Robertson, 114.

Frame forming end of vessel;
  Paterson, 11.
  Paterson, 57.

Frame with parallel motion;
  Gedge (*Cusset*), 114.
  Beddat, 150.
  Beauclerk, 178.
  Clark, 218.
  Grogan, 225.
  Freemantle and Freemantle, 239.

Floats driven by the waves;
  Hamilton, 355.

Oscillating blade;
  Williams, 9.
  Barker, 10.
  Russell, Spratt, and Press, 21.
  Owen, 27.
  Galloway, 30.
  Murray, 35.
  Morgan, 73.
  Reddie, 82.

Propellors, &c.—*cont.*
  Colwell, 110.
  Birkbeck (*Barker*), 167.
  Walker, 182.
  Cousins, 302.
  Evelyn, 374.

Radial arms carrying paddles;
  Baxter, 200.
  Bousfield (*Renwick*), 305.

Reciprocating frames or blades;
  Lambert-Alexandre, and Mallet, 15.
  Reuver, 29.
  Reeve, 32.
  Thompson, 34.
  Reeve, 34.
  Nelson, 53.
  Taylor and Baugh, 61.
  Brooman (*Meunier*), 65.
  Robb, 60.
  Buchanan, 67.
  Maberly, 68.
  Clark, 92.
  Reynolds, 92.
  Penrice, 94.
  Hirsch, 103.
  Collins and Chard, 108.
  Williams and Perkins, 109.
  Aldridge, 110.
  Hyde and Hooper, 113.
  Inchley, 120.
  Morris, 146.
  Lewis, 156.
  Baxter, 169.
  Fryer, 192.
  Parkes (*Vincent and Gowpy*), 194.
  Brooman (*De la Baume*), 196.
  Johnson (*Arnaud and Labriola*), 218.
  Davis, 224.
  Galli, 226.
  Le Breton, 228.
  Johnson (*Harris*), 281.
  Cousins, Hook, and Peace, 327.
  Fraser, 340.
  Watson (*Smith*), 351.
  Evelyn, 374.

Revolving blade (not screw);
  Balboni, 29.
  Germann, Germann, and Germann, 33.
  Truss, 151.

Rod working against bottom;
  Sager, 418 (*Supplement*).

Rope wound over drum;
  Bonell, 420 (*Supplement*).

Rudder;
  Sickels, 273.

Screw working in the air;
  Clark, 24.
  Sampson (*Taggart*), 91.

ropellors, &c.—*cont.*
Vertical drum;
  Kyle, 161.
  Clark (*Scalsi*), 183.
  Skinner (*Skinner*), 193.
Vibrating cylinder;
  O'Hara, 77.

Propelling vessels:"
  Penrose, 397 (*Supplement*).
  Deane, 411 (*Supplement*).
  Stow, 417 (*Supplement*).

ropulsion, modes of. *See* Motive power, and Propellers, various sorts of.

aft of cylinders with paddles:
  Clark (*Rojare and Rojare*), 225.

ailway to convey boats up inclines:
  Grahame, 13.

efrigerator for engine:
  Burrows, 3.
  Haddan, 4.
  De Bergue, 5.
  Burrows, 23.
  Howden and Morton, 84.
  Scott, 91.
  Bunson, 115.
  Bell, 129.
  Howden, 157.
  Clark (*Lighthall and Chrystie*), 185.
  Howden, 204.
  Knowelden, 217.
  Wright, 286.
  Newton (*Lighthall*), 297.
  Wood, 324.

ecording revolutions of shaft. *See* Counter, &c.:

eversing gear:
  Gâche, 42.

ail on land upon which wheels from boat work:
  Brooman (*Stackpole*), 369.

owing. *See* Oars.

od working against bottom. *See* Propellers, various sorts of.

owlock. *See also* Oars and outrigger:
  Readon, 411 (*Supplement*).
  Mason, 439 (*Supplement*).
  Barnes and Loach, 99.

Rowlock—*cont.*
  Watson and Davidson, 168.
  Green, 242.
  Macintosh and Thurgar, 311.
  Cox, 328.
  Furrell, 369.

Rudder. *See* Steering.

Salinometer:
  Picot, 27.

Screws to clear sand from vessel's course:
  Bourne, 1.
  Bourne, 18.

Sculling. *See* Oars:

Shaft, main:
  Howard, 4.
  Gâche, 42.
  Newton (*Arnier*), 74.
  Randolph and Elder, 89.
  Batchelor, 98.
  Elder, 102.
  Howden, 157.
  Miller, 174.
  Macnab, 209.
  Peters, 211.
  Cunningham, 314.

Shaft, paddle:
  Parsons (*Supplement*), 408.
  Newton, 47.
  Smith, 64.
  Charlton, 105.
  Muntz and King, 135.
  Harfield, 186.
  Silver and Moore, 194.
  Burden, 252.
  Page, 256.
  Hamilton, 315.
  Burchall, 353.

Shaft, propeller:
  Haycraft (*Supplement*), 413.
  Humphrys (*Supplement*), 417.
  Main (*Supplement*), 424.
  Moore, 2.
  Henry, 28.
  Gregory and Craymer, 28.
  Patridge, 30.
  Chaufour, 36.
  Browne, 41.
  Parsons, 49.
  Montgomery, 76.
  Randolph and Elder, 89.
  Stevens, 101.
  Silver, 134.
  Bousfield (*Renwick*), 148.
  Wilson, 163.
  Crichton, 164.

Shaft propeller—*cont.*
  Truss, 1[illegible].
  Moore, [illegible].
  Suckow and Habel, 197.
  Ashe (*Ashe*), 216.
  Owen, 216.
  Johnson (*Le Rouge and De Berly*), 219.
  Moore, 220.
  Cartwright, 221.
  Curtis, 224.
  Carwood, Boaz, and Colwell, 227.
  Duntze (*Ashe*), 233.
  Symonds, 245.
  Cartwright, 255.
  Winans and Winans, 258.
  Winans and Winans, 261.
  Watson, 264.
  Tucker, 266.
  Newton (*Serve*), 268.
  Humphrys, 283.
  Thornton, 305.
  Roberts, 313.
  Galloway, 313.
  Read and Fyfe, 324.
  Cartwright, 331.
  Stephenson (*Vensano*), 333.
  Girard, 345.
  Newton (*Eads*), 346.
  Johnson (*Le Rouge*), 370.
  Curtis, 382.
  Dudgeon, 385.
  Hughes, 389.

Starting gear;
  Limbert, 4.
  Limbert, 23.
  Humphrys, 176.

Springs to propel vessels. *See* Motive power;

Steam, discharged to propel vessel. *See also* Hydro-propulsion;
  Brooman (*Coulon*), 1[illegible].
  Parker, 213.
  Cochrane, 274.
  Andreux and Coulon, 304.
  Fontainemoreau (*Normond*), 307.
  Spink, 340.
  Parker, 376.
  Boulton, 383.
  Johnson (*Martin and Droop*), 386.

"Steam navigation;"
  Tauras, 402 (*Supplement*).

Steam-trap;
  Travis and Casartelli, 12.

Stopping vessel, means for;
  Rawstorne, 42.
  Maberley, 68.
  Reddie, 82.
  Humphrys, 176.

Steering:
  By ejecting water, &c. *See a* Hydro-propulsion;
    Geach, 26.
    Johnson (*Eaton*), 81.
    Barling, 112.
    Griffiths, 217.
    Terry, 228.
    Galloway, 310.
    Jopling, 326.
    Brookes (*Farcot, Farcot, F cot, Chateau and Farc* 350.
    Howden, 358.
    Boulton, 383.
    Kirk, 386.
    Boulton, 388.
    Randolph, 392.
    Harfield, 394.
  By floats:
    Rawstorne, 42.
  By paddle or blade;
    Reddie, 82.
    Clark, 92.
    Colwell, 110.
  By paddle wheels;
    De Rigel, 402 (*Supplement*).
    Brooman (*Jeandeau*), 1.
    Charlton, 106.
    Calvert, 298.
  By propeller;
    Henry, 28.
    Newton (*Huse and Huse*), 5
    Jones and Jones, 177.
    Johnson (*Le Rouge and Berly*), 219.
    Leigh, 219.
    Cartwright, 221.
    Hay, 223.
    Curtis, 224.
    Cartwright, 255.
    Watson, 264.
    Tucker, 266.
    Sickels, 273.
    Johnson (*Harris*), 281.
    Shaw, 299.
    Aitcheson, 299.
    Jackson, 308.
    Merriam, 366.
    Johnson (*Le Rouge*), 370.
    Griffiths and Rigg, 371.
    Curtis, 382.
  By reciprocating bars:
    Le Breton, 228.
  By special propeller or pa wheels;
    Singer, 152.

ering—*cont.*
  Weallens, 166.
  Braxton, 200.
  Gedge (*Levallois*), 251.
  Caudwell, 321.
  Clark (*Ganeval*), 382.
y vertical drum ;
  Kyle, 161.
rain of barges ;
  Bourne, 1.
  Bourne, 18.
bmarine vessels :
  Newton, 439 (*Supplement*).
  Delany (*Phillips*), 74.
  Bauer, 125.
  Merriam, 366.
perheating steam :
  Haycraft, 413 (*Supplement*).
  Lee, 435 (*Supplement*).
  Patridge, 6.
  Hédiard and Levieux, 26.
  Joly, 27.
  Montgomery, 76.
  Galloway, 83.
  Howden and Morton, 84.
  Rowan, 95.
  Boden and Clark, 96.
  Jack, 102.
  Wenham, 109.
  Brotherhood, 127.
  Sykes, Sykes, and Crosshead, 127.
  Butlin, 131.
  Fletcher, 136.
  Mennons (*Gache*), 144.
  Wilson, 163.
  Bury, 173.
  Ridley, 173.
  Armstrong, 181.
  Allchin and Allchin, 203.
  Clark (*Arnier*), 205.
  Macnab, 209.
  Parker, 213.
  Cowper, 231.
  Thierry, 253.
  Anndreux and Coulon, 304.
  Bousfield (*Thierry*), 383.
Thole-pin. *See also* Rowlock :
  Watson and Davison, 168.
Throttle valve. *See also* Governor :
  Charlton, 105.
Tiller. *See* Steering.
Towing :
  Bourne, 1.
  Kynaston, 8.
  Aldborough, 8.
  Robertson, 114.
  Schiele, 125.
Towing—*cont.*
  James, 168.
  Lebaudy (*Cail*), 190.
  Abel (*Cail*), 212.
  Gedge (*Troll and Mercier*), 263.
  Lillie, 305.
  Brooman (*Stackpole*), 369.
Train of boats, propelling :
  Bourne, 1.
  Bourne, 18.
Tubes for boilers, making :
  Potts, 111.
Turbines :
  Adamson and Cooper, 427 (*Supplement*).
  James and Grimshaw, 14.
  Mohr, 22.
  Galloway, 30.
  Scott, 56.
  Middleship, 85.
  Maxwell, 129.
  Stevenson, 141.
  Rammell, 155.
  Towl, 179.
  Mennons (*Thier*), 191.
  Standfield and Standfield, 202.
  Henry (*Coignard*), 207.
  Parker, 213.
  Henry (*Coignard*), 254.
  Myers and Forbes, 262.
  Yenn, 271.
  Græme, 275.
  Græme, 281.
  Myers and Gloag, 282.
  Wild, 283.
  Henry (*Coignard*), 284.
  Yenn, 292.
  Rosselet, 320.
  Rosselet, 345.
  Brookes (*Farcot, Farcot, Farcot, Chateau and Farcot*), 350.
Valves and valve gear :
  Slater, 403 (*Supplement*).
  Parsons, 408 (*Supplement*).
  Haycraft, 413 (*Supplement*).
  Craddock, 414 (*Supplement*).
  Humphrys, 417 (*Supplement*).
  Galloway and Galloway, 422 (*Supplement*).
  Galloway and Galloway, 423 (*Supplement*).
  Whitelaw, 423 (*Supplement*).
  Main, 424 (*Supplement*).
  Adamson and Cooper, 427 (*Supplement*).
  Thomson, 435 (*Supplement*).
  Moore, 2.
  Limbert, 4.
  Trappes, 11.
  Burdon, 16.
  Stewart and Hope, 20.

- Valves and valve gear—*cont.*
  - Limbert, 23.
  - Rowland, 23.
  - Gâche, 42.
  - Pirsson, 43.
  - Kingsley, 52.
  - Matley, 55.
  - Newton, 63.
  - Brooman (*Vanossi*), 66.
  - Bowie, 70.
  - Rowan, 71.
  - Newton (*Arnier*), 74.
  - Newcomb and Lovell, 82.
  - Galloway, 83.
  - Howden and Morton, 84.
  - Newton (*Sergeant*), 85.
  - Bateson, 85.
  - Marshall, 88.
  - James, 94.
  - Dunn, 97.
  - Batchelor, 98.
  - Gumpel, 100.
  - Elder, 102.
  - Hackworth, 104.
  - Sells, 111.
  - Spencer, 116.
  - Uren, 119.
  - Inchley, 120.
  - Hamilton and Silver, 123
  - Bell, 129.
  - Bousfield (*Dickerson*), 133.
  - Mennons (*Gâche*), 144.
  - Fuller, Jaques, and Fanshawe, 161.
  - Barling, 165.
  - Blake, 171.
  - Bury, 173.
  - Ridley, 173.
  - Humphrys, 176.
  - Macnab, 195.
  - Jobin, 201.
  - Howden, 204.
  - Sickels, 232.
  - Napier and Rankine, 234.
  - Wymer, 243.
- Valves and valve gear—*cont.*
  - Penn, 246.
  - Day, Lamb, and Summers, 252.
  - Stanley and Stanley, 270.
  - Holderness, 272.
  - Elder, 275.
  - Howden, 278.
  - Paterson, 279.
  - Robertson, 326.
  - Abel (*Tranchant*), 360.
  - Elder, 365.
  - Boyman, 372.
  - Kochs, 379.
- Vapourizer:
  - Spencer, 163.
- Vessel, revolving:
  - Newton (*Supplement*), 409.
  - Symes, 287.
  - Clark (*Masnata*), 362.
- Vessel, separate, for engine:
  - Ford, 274.
  - Duncan, 390.
- Water, ejected to propel vessel. *See* Hydro-propulsion.
- Weight used as motive power. *See* Motive power.
- Well, hot:
  - Limbert, 4.
  - Limbert, 23.
- Wheel. *See* Paddle-wheel.
- Windlass:
  - Kynaston, 8.
- Windmill on deck. *See* Motive power.

ERRATA IN PARTS I., II., AND III.

Since the publication of the first volume of the present series of abridgments the following errata have been discovered therein.

Page 3, line 31 from bottom, *for* " topple " *read* " toppe."
„ 17, „ 5 from bottom, *for* " Lutetice apud, C. Wechelum " *read* " Lutetice, apud C. Wechelum."
„ 20, „ 24 from top, *for* " Dickens " *read* " Dickins."
„ 39, „ 12 from top, *for* " Delolme " *read* " De Lolme."
„ 73, „ 25 from top, *for* " Passey " *read* " Parrey."
„ 123, „ 7 from top, *for* " Patterson " *read* " Paterson."
„ 129, „ 10 from top, *for* " Gemmel " *read* " Gemmell."
„ 178, „ 31 from top, *for* " Mayer, Henry " *read* " Henry, Mayer."
„ 187, „ 32 from top, *for* " Simon " *read* " Simion."
„ 193, „ 17 from top, *for* " Corcaden " *read* " Corscaden."
„ 246, „ 14 from top, *for* " Heilakker " *read* " Hielakker."

ERRATA IN PART IV.

Page 2, line 17 from top, *for* " place " *read* " plane."
„ 6, „ 13 from bottom, *for* " Partridge " *read* " Patridge."
„ 126, „ 1 from top, *for* " Humphreys " *read* " Humphrys."
„ 211, „ 19 from top, *for* " diapragm " *read* " diaphragm."

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